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Investigating the relationship between farmer health and farm income

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Investigating the relationship between farmer health and farm income

A thesis submitted in candidature for the degree of Doctor of Philosophy of the
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by

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Abstract

1. There has been recent concern regarding both the decline in farm incomes and the mental health of farmers due to the high number of recorded suicides. But to date few studies have sought to examine the relationship these variables in a formal and quantitative manner.

2. This study sought to do just this, and the key questions addressed by this work were:

   a) Does the mental health of farmers and their spouses/partners differ from the general population?

   b) Is farmer physical and mental health related to farm income?

   c) Is the adoption of agri-environment schemes related to farmers' mental health?

3. Data was collected via two surveys conducted over three years, 2002 to 2004, in Wales, UK. Survey 1 utilised the existing Farm Business Survey to deliver health questionnaires (SF-36) to farm households and supply physical and economic data on farm businesses. A total of 574 health questionnaires were delivered to 325 farms generating usable responses from 195 respondents representing 125 farms.

4. Survey 2 was conducted among attendees of agricultural shows using the GHQ-12. A total of 784 respondents completed questionnaires as part of this survey.

5. Results from Survey 1 showed poor correlation between SF-36 physical and mental health scores and farm income. Thus it was not possible to reject the null hypothesis that farmer health is not related to farm income. However, significant differences in SF-36 mental health summary scores for farm income quartiles, suggests that further research is merited.

6. Conversely, results from Survey 2 showed that the GHQ-12 scores for farmers and their spouses/partners were significantly higher than those of other show attendees, indicating they had poorer mental health.

7. The adopters of agri-environment schemes were found to have significantly higher SF-36 mental health summary scores (indicating better mental health) than non-adopters.

8. The findings related to agri-environment schemes are relevant to the development of integrated rural policy, and require further study. However, the general relationship between farmer mental health and farm income is unclear and warrants further investigation.

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Abbreviations and Acronyms

Term

DA	Disadvantaged Area.
ECU	European Currency Unit.
ESU	European Size Unit.
FBS	Farm Business Survey.
FFHP	Farm Family Health Project – umbrella term for the study reported in this thesis.
FMD	Foot and mouth disease.
GDP	Gross Domestic Product
GHQ-12	The twelve itemed version of the General Health Questionnaire instrument.
GP	General Practitioner
LFA	Less Favoured Area.
MCS	Mental Component Summary – the SF-36 summary score that measures. the mental health status of respondents.
PCS	Physical Component Summary – the SF-36 summary score that measures the physical health status of respondents.
SDA	Severely Disadvantaged Area.
SF-36	The thirty-six itemed version of the Short Form health questionnaire instrument.
VAS	Visual Analogue Scale

Chapter 1: General introduction

General introduction

1.1 Background

The determinants of health for individuals and communities are many and varied (WHO, 2004). The World Health Organization (2004) suggests nine major headings for the determinants of health: income and social status; education; physical environment; social support networks; culture; genetics; personal behaviour and coping skills; health services; gender. These are of particular interest to policymakers charged with the responsibility of improving the health of a given population, whether a whole nation or a specified sub-group within a nation. This is because some of these, such as income, education, physical environment, and health services, may be directly influenced by the implementation of government policies. Of these, income is probably the easiest to influence through the use of monetary and fiscal policy.

1.1.1 The relationship between health and income

The relationship between income and health is complex (Benzeval *et al.*, 2001; Judge and Paterson, 2001). While research has generated a considerable body of literature examining different facets of this relationship, two main hypotheses have emerged: "the absolute income hypothesis" and "the relative income hypothesis". These will be briefly considered in turn below.

Absolute income hypothesis

The absolute income hypothesis postulates that population health is positively related to average income, although as income increases the rate of health improvement decreases (Preston, 1975; Judge *et al.*, 1998; Benzeval *et al.*, 2001; Gravelle *et al.*, 2002; Deaton, 2003). Similarly, at the individual level, holding other factors constant, the higher the income of an individual the better their health. While some studies have adopted a macro perspective through international comparisons (Preston, 1975; Deaton, 2003), others have been conducted at the level of the individual or community (Benzeval *et al.*, 2001; Martikainen *et al.*, 2003). The former tend to use macro economic indicators, such as Gross Domestic Product (GDP) or Gross National Product (GNP), and national mortality and morbidity statistics, while the latter often involve surveys of specific population groups.

The relationship between income and health can be illustrated at the global level through inter-country comparisons by using components of the Human Development Index. This index was created by the United Nations to provide a summary measure of human development to enable geographical and inter-temporal comparisons. The Human Development Index is calculated using the simple average of three sub-indices that cover life expectancy, education, and standard of living (UNDP, 2003: p.341). Figure 1.1 plots two of these sub-indices, the Life Expectancy Index and the GDP Index, to show how income and health are related at the global level. The Life Expectancy Index reflects life expectancy at birth and can be used a proxy measure for health, while the GDP Index reflects standard of living and is based on GDP per capita adjusted for purchasing power parity. Generally, countries with a higher score on the GDP Index tend to have a higher score on the Life Expectancy Index: health increases as income increases, although at a diminishing rate. This occurs because initial increases in income lead to major health benefits that accrue from addressing basic human needs such as securing adequate nutrition and shelter (World Bank, 1993: p.7). Once these needs have been met further increases in income will provide additional health benefits, such as allowing the purchase of health care, but the effect on life expectancy will be proportionately less.

Figure 1.1 Life Expectancy Index against GDP Index for 175 countries in 2001.
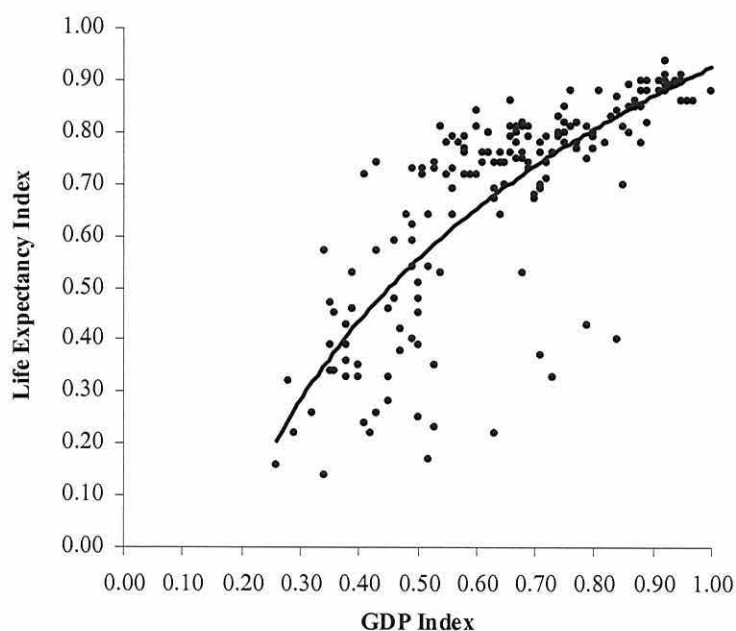
Table notes
Source: Data from UNDP, 2003 pp.237-240.

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However, there are some problems with the use of macro-economic indicators, such as per capita Gross Domestic Product (GDP), along with mortality statistics, such as life expectancy and mortality rates for infants under five years old as proxy health measures. Clearly such indicators give no indication as to the quality of life experienced by national populations. This is an issue that is especially relevant to poor countries where illness, often exacerbated by malnutrition, is prevalent and health care service resources are very limited. The development and use of summary measures of population health has recently been examined in detail by the World Health Organization (WHO, 2002). Similarly, average (per capita) income figures may mask very uneven distributions of income within countries. In recent years income inequalities have increasingly been used to explain health differences between both countries and the individuals within a country.

Relative income hypothesis

The relative income hypothesis states that it is not just the absolute level of income that determines the health of individuals, but the distribution of income within society (Wilkinson, 1992, 1996, 1997; Gravelle *et al.*, 2002). At high levels of absolute income the marginal health benefits of additional income may become negligible (or even negative). Income inequalities may be more significant for societies as the average level of income increases (Gravelle *et al.*, 2002). A wide range of empirically based studies have been conducted over the past twenty-five years to investigate the importance of income inequalities in determining health. Some of these have looked at individual countries (Ecob and Smith, 1999; Weich, *et al.*, 2002; Wildman, 2003, Fritzell, et al., 2004), while others have made inter-country comparisons (Åberg Yngwe *et al.*, 2001).

However, the exact relationship between income and health remains controversial. Gravelle (1998) has gone as far as suggesting that the relationship between income inequalities and health may be a "statistical artefact" arising from the use of aggregate data. Furthermore, the use of aggregate cross-sectional population data to support income/health hypotheses regarding individuals have been criticised (Gravelle *et al.*, 2002).

1.1.2 Farm Incomes

This thesis is concerned with the interaction of economics and farmer health. Having reviewed the relationship between economics and health in the previous section this section discusses the relationship between agriculture and economics, and the next section reviews farmer health.

Government support for agriculture

There has been a long history of government intervention to assist the agricultural sector, an early example being the Corn Laws that operated in the UK in the nineteenth century. In more recent times, the food shortages experienced during, and immediately after, the Second World War provided much of the impetus for agricultural policy formulation in the UK. The objectives of post-war agricultural policy in the UK are outlined in the Agriculture Act of 1947 as:

> "...promoting and maintaining, by the provision of guaranteed markets and assured prices...a stable and efficient agricultural industry capable of producing such part of the nation's food and other agricultural produce as in the national interest it is desirable to produce in the United Kingdom, and of producing it at minimum prices consistent with proper remuneration and living conditions for farmers and workers in agriculture and an adequate return on capital invested in the industry." (see Tracy, 1989)

Immediate post-war agricultural policy emphasised the need to improve food security through increased agricultural production, while protecting the living conditions and income of farmers and farm workers. In 1973 the UK joined the European Economic Community (EEC) whereupon domestic agricultural policy was replaced by the Common Agricultural Policy (CAP). Article 39 of the Treaty of Rome set out the objectives of the CAP (see Hill, 1990 p.313 and footnotes therein) as being:

i. "to increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour;

ii. thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;

iii. to stabilise markets;

iv. to assure the availability of supplies;

v.   to ensure that supplies reach consumers at reasonable prices."

The objectives of the CAP, similar to those of the 1947 Agriculture Act, are largely defensive in nature, seeking to specifically protect the agricultural sector against long-term adjustment and short-term shocks, the origins of which may be either external or internal.

The two major motivations underlying defensive assistance to agriculture are to redistribute domestic wealth towards farmers and to insulate domestic agricultural markets from trade shocks. Redistributive policies set out to address the so called 'farm income problem', where incomes in the agricultural sector are found to lag behind those in other sectors of the economy. The experience of the industrialised countries suggests that this accompanies rapid economic growth. In common with other sectors of the economy, agricultural output rises significantly, although the terms of trade between the agricultural sector and the rest of the economy deteriorate. This is reflected by a decline in the relative importance of agriculture as measured by share of gross domestic product and proportion of labour force employed. The precise mechanisms by which these changes occur are open to debate and various theories have been advanced, often linked to the process by which technical innovations are adopted. However, certain intrinsic characteristics of the market for agricultural produce are of significance.

Agricultural products, for example, typically have low price elasticities of demand, together with correspondingly low income elasticities (Hill and Ingersent, 1977). Increases in supply brought about by technical progress will therefore tend to depress prices and cause a fall in revenues, *ceteris paribus*. This may induce farmers to practice more intensive farming methods and provide an incentive to innovate and adopt additional technology (which tends to be labour saving) in an attempt to compensate through reduced costs, greater efficiency and increased output. The downward pressure on prices is therefore likely to increase, further reducing revenues (and thus profitability and incomes) given the low price elasticity of demand. There is also unlikely to be a favourable shift in demand since the population levels of the industrialised countries are relatively stable.

This situation implies that factor incomes are likely to fall and lead to a reallocation of resources. However, although the substitution of capital for labour has led to a reduction in the amount of labour employed, there is evidence of factor immobility (Hill and Ray, 1987). In the case of capital employed in agriculture this is

due largely to a high degree of specificity, while farmers are reluctant to leave agriculture for reasons that may include: the high degree of social upheaval through leaving a way of life, poor alternative employment prospects, as well as historic and family ties. This further accentuates the supply situation.

As well as the inherent downward price pressures discussed above, income fluctuation, caused by a number of factors, is also a problem. These include long term price trends and seasonal variations in supply and demand, as well as cyclical price variations and unpredictable year to year variations, mainly due to weather, adverse soil conditions, pests and disease (Hill and Ingersent, 1977). Variable output combined with low price elasticities of demand mean that revenues (and hence incomes) fluctuate greatly. Another difficulty is that production decisions have to be made well in advance of knowing what output or market conditions are likely to be and once resources are committed they cannot easily be changed.

Recent trends in UK farm incomes

In the UK 'total income from farming' is an aggregate measure of income that represents compensation to "...farmers, partners and directors and spouses, if working on the farm and most family workers..." for their manual and managerial labour as well as the return on their capital (DEFRA, 2002). Figure 1.2 shows that total income from farming has fluctuated significantly over the last thirty years. However, the long term trend has been downwards, with the total income from farming in 2004 being only around 40% of that for 1973 (Figure 2.2). The dramatic decline from 1995 to 2001 is attributable to a combination of increases in the exchange rate, lower world commodity prices, Bovine Spongiform Encephalopathy (BSE), and foot and mouth disease (FMD).

The fall of around 70% in real aggregate income for the agriculture sector between 1995 and 2001 reflected the experience of individual farms. Findings from annual surveys reported by Deloitte and Touche (2002) indicate that average net farm incomes fell from £80,000 in 1996/1996 to £8,000 in 2000 before falling to £2,500 in 2001 due to FMD (Deloitte and Touche, 2002).

Figure 1.2. Total income from farming in the UK (£ millions at 2004 prices) for the period 1973 to 2004, with trend line. Source: DEFRA, 2005.
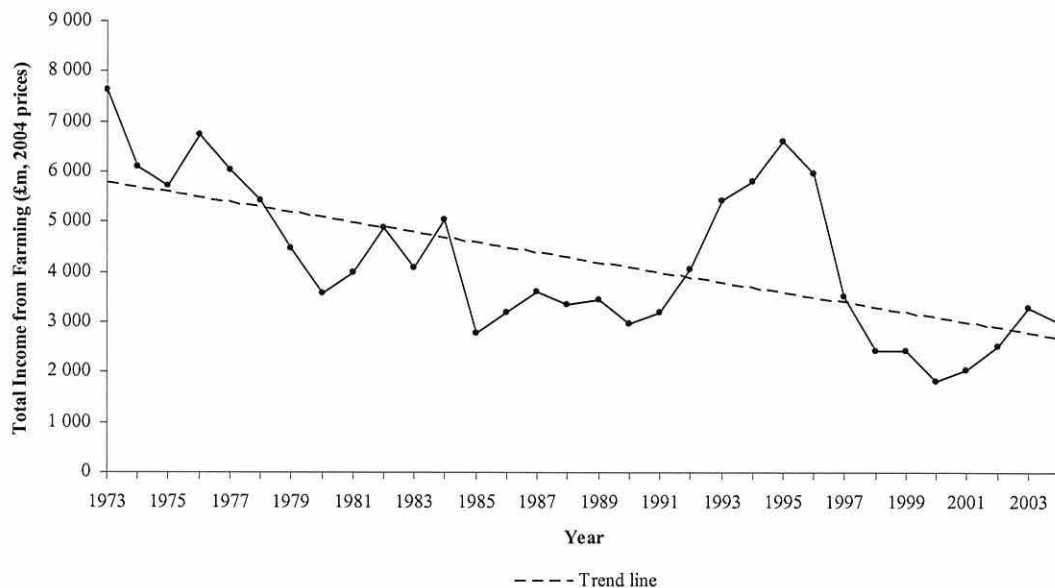
1.1.3   Farmer health

Farming is a hazardous occupation. The health risks that farmers' are exposed to through their work are many and varied. They include the effects from working with potentially toxic chemicals (for example, organophosphate sheep dips, fungicides, pesticides, detergents, and fertilisers), exposure to zoonoses (diseases caused by organisms common to man and animals), and airborne agents (such as spores, grain dust, and mites) (Walsh, 2000). Farmers are also at risk of arthritis, muscoskeletal disorders, and back injuries from heavy lifting.

In addition, agriculture is also associated with a high rate of accidents. Data for 1998 to 2001 shows that farming had the second highest fatal injury rate for any occupation in the UK, only exceeded by the quarrying of stone, ore and clay (National Statistics, 2001). In the ten years to 2001, 437 workers and 74 members of the public were killed on farms as a result of accidents (National Statistics, 2001). The high rate of fatal accidents among farmers and farm workers is not confined to the UK. In the United States agriculture is also rated among the top three occupations with respect to mortality at work (Myers and Hard, 1995).

Studies in the UK (Booth and Lloyd, 1999; Booth et al., 2000), United States (Ragland and Berman, 1990-91) and Australia (Page and Fragar, 2002) have also found that farming as an occupation is associated with an increased risk of suicide. In the UK, for the period 1979 to 1990, 526 farmers committed suicide with a further 190

farmers, horticulturalists and farm managers committing suicide between 1991 and 1996 (Hawton et al., 1998). Although some other occupations (such as veterinary surgeons, pharmacists, and dentists) had a higher risk of suicide, the number of suicides was greatest among farmers (Hawton et al., 1998). Psychological autopsies conducted on farmers that had committed suicide between 1991 and 1993 found that in 69% of cases there was evidence that the farmer had been suffering from a definite or probable mental disorder at the time of death (Hawton et al., 1998).

1.1.4   Why is farmers' health important?

The health of every individual is important, both to the individual concerned and to society in general. From an economic standpoint a healthy population is likely to be more productive and capable of generating wealth, which should bring benefits to society as a whole. Farmers' health in this respect does not differ from any other group within society. However, given their role as managers of the countryside, are there additional factors which may make their health and wellbeing of additional significance? Outlined below, in the context of Wales, are five factors that suggest that this may be the case.

Environment

Despite the decline in the significance of agriculture as a source of income and employment generation, it remains the predominant use of land in Wales. Around 80% of the surface area of Wales (comparable to the European Union figure of 80%) is classed as agricultural (NafW, 2003a). Over three-quarters (77%) of this area is so poor agriculturally that it is officially designated as Less Favoured Areas allowing special financial support to be given to farmers. Yet, when viewed from an environmental perspective, the Less Favoured Areas may be regarded as "more favoured areas" (Hughes, 1996) for their attractive landscapes, natural habitats and wildlife refuges. The importance of these environmental public goods produced by farmers is increasingly recognised in the conditions attached to agricultural support payments. Voluntary agri-environment schemes, such as Tir Gofal in Wales, are also designed to enhance the natural environment. Farmers' role as custodians of the countryside means that their actions and omissions have an effect on a large number of people.

Economic significance

Economic indicators show that the direct contribution of agriculture to the economy is relatively small with a contribution to Gross Domestic Product (GDP) and employment (full time equivalent jobs) of around 2% and 2.7% respectively (NafW, 2001). Nevertheless, these aggregate figures often understate the importance of agriculture locally, since in many parts of rural Wales the agricultural sector may support up to 10% of employment (NafW, 2001). In addition, environmental public goods produced by farming are attractive to tourists and support a tourism industry that accounts for around 8% of Welsh GDP and is a significant source of jobs.

Stability of farm households

The agricultural sector in Wales comprises of nearly 30,000 holdings (NafW, 2001) and is dominated by family owned and run farm businesses, which have brought stability and social cohesion to rural areas (Hughes *et al.*, 1996). Evidence of this stability is shown in the results of a survey among farmers attending the Royal Welsh Agricultural Show in 1998 (Boulanger *et al.*, 1999). Less than 2% of the 325 respondents (84% of whom farmed in Wales) indicated that they were divorced or separated (Boulanger *et al.*, 1999). This may be reassuring given that decisions to enhance the natural environment (such as planting woodland) often require a long-term commitment which could be undermined by an adverse family situation.

Welsh language

There is statistical evidence (Hughes *et al.*, 1994) arising from analysis of the population census data for 1981 and 1991 that agriculture is closely linked with the Welsh language.

Animal welfare

It seems likely that animal welfare could be adversely affected by farmers in poor health. This could arise through farmers being unable to physically tend their livestock or through poor decision making as a result of poor mental health.

1.1.5   Farmer health and farm financial status

Introduction

The absolute income hypothesis, outlined earlier, suggests that the absolute level of an individual's income affects their health. In poor countries where subsistence agriculture is prevalent, farm output, farm income, and farm family health would appear to be inextricably connected (see diagram in Norton and Alwang, 1993: p.30; Croppenstedt and Muller, 2000). Farm output can be used to provide nutrition for the farming family either directly, or through income generation that allows food to be purchased. Maintaining an adequate level of nutrition is a prerequisite to maintaining good health. Conversely, health and nutrition are linked to agricultural productivity and income generation (Cropperenstedt and Muller, 2000): poor health through inadequate nutrition will adversely affect an individual's ability to work effectively. In addition, few poor countries have a free healthcare system and usually patients must pay in order to receive treatment. For families in poor countries an inadequate income may therefore become a life and death issue.

The populations of rich countries, such as the UK, are in a very different situation. The widespread availability of food, access to a social welfare system and universal coverage under a public health care system, means that any connection between the level of incomes and the physical health of individuals is likely to be much less pronounced. Therefore, in developed countries the link between income and health has often been examined in the context of unemployment (Moser *et al.*, 1987; Mathers and Schofield, 1998; Comino et al., 2003; Dooley, 2003; Röjdalen, et al, 2004). The main source of income for most adults will be wages derived from paid employment (or self-employment), the loss of which often causes a severe decline in income and possibly financial stress. Nevertheless, there has been considerable debate about the direction of any causal relationship between health and unemployment: does unemployment cause ill health or are those that are ill more likely to be unemployed? Moser *et al.* (1987) and Mathers and Schofield (1998) reported that the relationship between higher unemployment and poor health existed for reasons other than initially poor health. Indices of deprivation in communities often use measures of income and employment as important components. In the Welsh Index of Multiple Deprivation Index 2005 (WAG, 2005), for example, the proposed combined weighting of income and employment was fifty percent.

For UK farmers there is unlikely to be any relationship between their physical health and their level of income. However, events in recent years such as the foot and mouth disease (FMD) epidemic of 2001 have focused attention on the mental health of farmers.

The effects of the FMD crisis on farming families were highlighted in the media and farmer suicides associated with the outbreak were reported in the press (Batty, 2001; Brown and Hetherington, 2001, Carter, 2001; Lomax, 2001). Interest among academics in farm economics and the mental health of farmers can be traced back to the farm crisis in the United States during the 1980s.

The farm crisis in the United States during the 1980s

The farm crisis of the 1980s followed a period of relative prosperity and expansion for US farmers. In the 1970s, with low real interest rates and significant increases in the value of land, many farmers in the US borrowed to invest in their businesses (Farmer, 1986; USDA, 1996, 2005). While this enabled farmers to increase production and take advantage of high commodity prices and export opportunities, it left them financially vulnerable (USDA, 1996).

In the 1980s monetary policies were implemented in the United States to reduce inflation, causing interest rates to rise sharply (USDA, 1996). The rise in interest rates, combined with falls in commodity prices, income, and land values caused major financial problems to farmers, especially those that had borrowed heavily (USDA, 1996). The effects were dramatic, with Midwestern farmers suffering an acute economic downturn (Farmer, 1986; Belyea and Lobao, 1990; Meyer and Lobao, 2003). In Missouri, for example, total farm income declined from US$1.3 billion in 1979 to just US$151 million in 1983 (Heffernan and Heffernan, 1986).

Media coverage of the psychological distress caused by farm repossessions arising from the collapse of agriculture prompted renewed interest in issues surrounding rural mental health with the scientific community (Ortega, et al., 1994). Ortega and colleagues (Ortega et al., 1994) identify the mid-1980s with the development of "...an almost entirely new farm crisis literature" that was distinct from the previous rural community health tradition.

One of the earliest and most influential studies to examine the effects of the farm crisis of the 1980s on the mental wellbeing of farm families was by Heffernan and Heffernan (1986). Data for the study was collected using personal interviews with 42

farming couples from an agricultural county in Missouri. The couples had all been forced out of farming due to financial difficulties between the beginning of 1980 and the end of 1984 and almost all had experienced depression, many for a prolonged duration. Respondents also reported becoming withdrawn from friends and family, feeling more aggressive, and between a fifth and a quarter increased their tobacco and alcohol consumption. Debt was a major issue among respondents with significant numbers reporting unpaid borrowings. Despite having a relatively small sample size and no mental questionnaire instrument, the study rose to prominence after it was used in testimony to a hearing of the Joint Economic Committee of the United States Congress (17th September, 1985) investigating the effects of the farm crisis.

Contemporaneous with Heffernan and Heffernan (1986), Salamon and Davis-Brown (1986) adopted a different perspective by conducting a study of farm families whose farm businesses had survived the US farm crisis of the early 1980s. The study used in-depth interviews and observation of seven farming families in north-central Illinois. The families in the survey sample were characterised as having "risk-aversive yeoman" values that placed continuity of farming operation as among their highest priorities (Salamon and Davis-Brown, 1986). Their farm management was generally in contrast to the more entrepreneurial farmers, many of whose businesses had failed due to the farm crisis. While the two groups often shared similar socio-demographic characteristics, they had very different attitudes to risk-taking. However, a farm failure by a yeoman operator was likely to lead to greater emotional distress due to the loss representing "a debt to past and future family members" and a violation of family values (Salamon and Davis-Brown, 1986). Despite the limited sample size, this study illustrated the deep sense of identity that some farmers have with the land, almost to the point of it being sacred.

Further studies included one by Bultena et al. (1986) who studied a sample of 1,040 farmers in Iowa in late 1984/early 1985 to examine the impact of the farm crisis on farm businesses/families. Younger farmers with higher debt/asset ratios, reported a deterioration in the quality of family life. Two years later in 1987, Belyea and Lobao (1990) studied a random sample of 503 Ohio farmers to assess the effects of the farm crisis on farmer depression. The study used an initial telephone survey along with a follow-up postal survey to collect data. The principal financial data collected was net family income and the household debt to asset ratio (farm and non-farm). Economic hardship and perceived stress were used to assess the farmer's appraisal of their

situation. The economic hardship scale was derived from an economic strain model contained in Pearlin *et al.* (1981), while perceived stress was measured using three questions. In addition, the authors used a coping scale together with the Center for Epidemiological Studies - Depression (CES-D) scale, a 20 item health questionnaire instrument for measuring symptoms of depression. This comprehensive study found that depressive symptoms were closely linked to apparent economic hardship, economic vulnerability (high debt asset ratios), and perceived stress.

Similarly, Schulman and Armstrong (1989) used data collected in 1987 from a random sample of 883 farmers in North Carolina to investigate the relationship between demographic (age), farm structure (area, number of days of on-farm/off-farm employment), income (total family income, percentage of total family income derived from farming), and social support variables and perceived stress. A modified version of the Perceived Stress Scale found in Cohen *et al.* (1983) was used to derive the Perceived Social Psychological Distress Index for respondents. Younger farmers were found to be the most distressed and the only significant structural variable was number of days on-farm. A curvilinear relationship was found to exist between total family income and perceived distress, while financial concern was positively related to perceived distress. The authors subsequently used data collected in 1988 from a further random sample of 595 farmers in North Carolina to examine the relationships between farm enterprise financial strain, household economic hardship, personal control, and depression (Armstrong and Schulman, 1990). The health questionnaire instruments used were similar to Bultena *et al.* (1986): an economic hardship measure derived from Pearlin *et al.* (1981), a modified CES-D scale, and items from the Perceived Stress Scale found in Cohen *et al.* (1983). While it was not possible to establish causal direction with certainty, the resultant covariance model suggested that increased perception of household hardship was associated with increased depression and a reduction in perceived control.

Ortega *et al.* (1994) looked at differences in mental health between rural and urban populations in Nebraska during the farm crisis of the 1980s. Their study was unusual in that it used panel data collected from three telephone surveys in 1981, 1986 and 1989 with 985 respondents that were included in all three years. Mental health was assessed using a modified version of a questionnaire instrument developed by Warheit (Warheit, 1979). The economic position was examined at the community level, as well as at the level of the individual. However, at the individual level the main economic

indicator was a single question asking whether the respondent felt that they were in a better, similar, or worse financial position than two years previously. Only in the 1989 survey were supplementary questions added to elicit further economic information, though this stopped short of asking for actual income amounts and concentrated on indicators of economic stress such as having to take an additional job.

The study found that there was a relationship between economic changes resulting form the farm crisis and the presence of psychological symptoms. Indeed, the authors (Ortega *et al.*, 1994: p.613) suggest that, "...community economic climate has mental health consequences beyond those stemming form their impact on respondents' personal financial prospects." Moreover, depression in farmers was found to be linked to changes in the farm economy, with the highest levels of depression being recorded between 1981 and 1986 at the height of the farm crisis.

Other studies conducted in the United States covering the period of the farm crisis explicitly sought to investigate suicide (Stallones, 1990; Ragland and Berman, 1990-91; Gunderson *et al.*, 1993) and stress (Davis-Brown and Salamon, 1987; Walker and Walker, 1987) among farmers. Using data from fifteen states, Ragland and Berman (1990-91) found evidence to suggest that the number of farmer suicides was related to economic stress. An important study in relation to future research in the UK looking at farmer stress was reported by Eberhardt and Pooyan (1990).

Farmer stress

While medical and social scientists have long been interested in the interaction of social, psychological and environmental factors with illness, it is only in more recent times that attention has focused on identifying the processes by which stressors act as a prelude to physical or mental health problems (Warheit, 1979). Although definitions of stress vary (Warheit, 1979; Beehr, 1995) and measurement is problematic (Dougall and Baum, 2001), there is general agreement that, "stress is (or can be) adaptive, that it is associated with threatening or harmful events, and that it is typically characterised by aversive or unpleasant feelings and mood" (Dougall and Baum, 2001). More recently, the Centre for Stress Management has stated, "Stress occurs when pressure exceeds your perceived ability to cope" (Centre for Stress Management, 2004), while the Health and Safety Executive (HSE, 2004) defines stress as, "the adverse reaction people have to excessive pressure or other types of demand placed on them." Prolonged stress may result in physical and mental health problems (Quine, 1998).

While several studies had looked at stress among farming families in the United States during the farm crisis (Bultena *et al.*, 1986; Davis-Brown and Salamon, 1987; Walker and Walker, 1987; Schulman and Armstrong, 1989; Armstrong and Schulman, 1990), Eberhardt and Pooyan (1990) asserted that much of the literature was flawed as there was a "...lack of empirically developed and tested measures." They conducted a postal survey among farmers in the north central United States to "...develop and test a psychometrically sound measure of farm stress" Eberhardt and Pooyan (1990). At the core of the survey, which generated 362 usable responses, was the twenty-eight item Farm Stress Survey. This used a seven point Likert-type scale ranging from "not at all" to "an overwhelming extent" to assess the extent to which items were a source of worry or concern. In addition a six item Life Satisfaction scale, an eleven item Emotional Strain Symptoms scale and an Illness Frequency scale were included in the questionnaire. Using factor analysis six main categories of stressor were identified which were labeled: Hazardous Working Conditions; Geographic Isolation; Personal Finances; Time Pressure; Climatic Conditions; General Economic Conditions. Using regression analysis, Personal Finances and Time Pressure were identified as being the two most significant predictors of Life Satisfaction, Emotional Strain, and Illness Frequency. The authors acknowledged the limitations of this study, especially with respect to the 28% response rate, and suggested that further research should use a broader sample of farmers. A later study by Kidd *et al.* (1996) used qualitative data gathered from focus groups to establish a link between the stress experienced by farmers and an increased risk of farm accidents resulting from fatigue.

UK studies

Interest among the academic community in the UK regarding the health of farmers and farm incomes has been a relatively recent phenomenon. An early study reported by McGregor *et al.* (1995) adopted and adapted the methodology of Eberhardt and Pooyan (1990) to survey farmers attending agricultural shows in England and Scotland in 1994. Respondents were asked to rate the severity of stress caused by 35 different factors on a scale of one (none) to five (very severe), along with the frequency that the stress occurred on a further scale of one (never) to five (all the time). A total of 318 usable questionnaires were collected. The highest ranked stressor was found to be "filling in government forms", followed by "uncertainty about weather conditions" and "adjusting to new government regulations and policies". The highest ranked stressors differed

from those identified in the Eberhardt and Pooyan (1990) study and financial stressors appeared to be less important. Nevertheless, two of the primary stressors (paperwork and regulations) identified by McGregor *et al.* (1995) would have been directly linked to subsidy payments (and hence farm income).

Boulanger *et al.* (1999a), using a modified questionnaire instrument, adopted the methodology of McGregor *et al.* (1995) and surveyed farmers attending the Royal Welsh Agricultural Show in 1998. A total of 325 usable questionnaires were completed by farmers. Once again two of the three most highly ranked stressors included "filling in government forms" and "adjusting to new government regulations and policies", with the third most highly ranked stressor being "not enough ready cash". While McGregor *et al.* (1995) and Boulanger *et al.* (1999a) showed an indirect and direct connection respectively between farm finance and stress, neither study provided any quantitative evidence concerning the mental health of farmers.

Such evidence is rare (Hughes and Kready, 1996), although a number of local, small scale studies are found in the grey literature, some of which are examined in Lobley *et al.* (2004). Exceptions include Eisner *et al.* (1998), Simkin *et al.* (1998), Booth and Lloyd (1999) and Thomas *et al.* (2003).

Eisner *et al.* (1998) studied 154 male farmers and age-matched controls from a rural general practice in North Yorkshire using the Hospital Anxiety and Depression Scale (HADS) and a selection of attitudinal questions. It was found that farmers suffered more anxiety and depression than the non-farming controls, but the difference was not statistically significant. Unfortunately, the attitudinal questions did not include any items relating to the financial position of the farm business, personal finances, or financial pressure.

A postal survey of farmers in England and Wales, conducted by Simkin *et al.* (1998) in 1995/1996, using a stress questionnaire generated a sample of 500. Similar to McGregor *et al.* (1995) and Boulanger *et al.* (1999a) predominant stressors were identified by respondents as "record keeping and paperwork" (62%), "difficulty understanding forms" (56%), and "the effects of new legislation" (49%). Nearly a quarter (23%) of respondents reported financial difficulties and over three-quarters (79%) reported financial concerns. No mental health questionnaire was included.

Booth and Lloyd (1999) studied a sample of 303 farmers from a postal survey of 1,000 members of the National Union of Farmers in Devon, Cornwall, and Somerset in 1995. Respondents were asked to complete the Hospital Anxiety and Depression Scale

(HADS) and the 28-item version of the General Health Questionnaire (GHQ-28) along with supplementary questions relating to sources of stress and demographics. Sources of stress were found to be similar to McGregor *et al.* (1995), with new legislation, paperwork and media criticism being highlighted. The number of stressors experienced by respondents was related to scores indicating poorer mental health on both mental health questionnaire instruments. Significant differences were found between male and female respondents, with females having poorer mental health. However, the number of female respondents (11%) was relatively small and the authors indicated that comparisons to previous UK studies were difficult to make.

In more recent times Thomas *et al.* (2003) studied a sample of 425 farmers from three areas of England who were surveyed in 1999. The survey questionnaire was completed by respondents using a computer and used the Revised Clinical Interview Schedule (CIS-R). This questionnaire instrument covers fatigue, sleep problems, irritability, worry, depression, depressive ideas, anxiety, obsessions, concentration and forgetfulness, somatic symptoms, compulsions, phobias, worry about physical health, and panic (Thomas *et al.*, 2003). A control group was used comprising of 9,830 subjects from the National Psychiatric Morbidity Survey of Great Britain which was conducted in 1993 and used the CIS-R. The study reported a lower prevalence of psychiatric morbidity among farmers compared to the general population, though they were more likely to express the view that life was not worth living.

Present study

The number of UK studies looking at the mental health of farmers has been relatively small. Earlier studies (McGregor *et al.* (1995); Boulanger *et al.* (1999a); Simkin *et al.* (1998)) concentrated primarily on identifying the main sources of stress experienced by farmers, while more recent studies (Eisner *et al.* (1998); Simkin *et al.* (1998); Booth and Lloyd (1999); Thomas *et al.* (2003) have sought to provide quantitative evidence through the use of established mental health questionnaire instruments. However, no UK study has simultaneously measured farmer health and collected farm financial data to explore the possible links between them. The reasons for this are understandable, as financial details are very personal to individuals and accurate figures are likely to be difficult to collect. Previous studies conducted in the United States often used highly simplified and subjective measure for assessing the economic/income situation faced by respondents.

The present study seeks to address this apparent gap in the literature by looking at the relationship between the health of farmers and farm income. Known as the Farm Family Health Project, the study seeks to explore the links between farmer physical and mental health in the context of the absolute income hypothesis. The next section outlines the methodology adopted.

1.2   Methods

Introduction

The Farm Family Health Project commenced in October 2001 in the immediate aftermath of the FMD outbreak. While the main purpose of the study was to explore the links between the financial status of farms and the health of farmers, the utilisation of health care services by farmers and their spouses/partners was also examined along with the perceived barriers to accessing those services. To investigate these issues six main research questions were formulated:

1. Does the mental health of farmers and their spouses/partners differ form the general population?

2. How does the mental and physical health of farm families compare to the general population?

3. How does the incidence of illness among farm families and their utilisation of health care services compare to the general population?

4. What are the perceived barriers to farmers and their spouses accessing health care services and what improvements would they like to see in health care service provision?

5. Is farmer physical and mental health related to farm financial status?

6. Is the adoption of agri-environment schemes related to farmers' mental health?

Data sources

Secondary data, such as those available through the Welsh Assembly Government, are often highly aggregated and do not provide the necessary detail required to match farm economic data to farmers' health. It was therefore decided that a survey would be conducted of farm households in Wales to collect health and income data. This was ultimately undertaken with the assistance of the Farm Business Survey in Wales. In addition it was decided that a survey (repeated for each of the three years of the study) would be conducted among attendees of the Royal Welsh Agricultural Show to provide

a comparison between the mental health of farmers and that of the general population. Each of the surveys is briefly outlined below.

1.2.1 Survey of farm households in Wales

Introduction

The need to collect health and income data from farm households in Wales presented two major challenges. The first was to determine how to obtain the contact details of farmers to enable a sample to be recruited and surveyed. The second was to determine how to actually collect the data once the sample had been recruited. These issues are examined more closely below before discussing the solution adopted for the present study.

Recruiting the survey sample

Official lists of farmers, compiled from such sources as the annual June agricultural census and maintained by the Welsh Assembly Government and the Department for Environment, Food and Rural Affairs (DEFRA), are generally not available to researchers (Errington, 1985; Emerson and MacFarlane, 1995; Burton and Wilson, 1999). Other possibilities available to recruit farmers included using a market research company database, approaching the farming unions, or using a directory such as Yellow Pages. Each of these has a number of advantages and disadvantages.

Market research companies maintain databases of the contact details for businesses grouped using one of the standard industrial classification systems. A major advantage of using such a service is that it enables a contact list to be assembled from a single source, with the possibility of address labels being supplied to simplify survey logistics. Nevertheless, difficulties may arise since coverage of businesses in a specialist sector, such as agriculture, may not be comprehensive for a given geographical area. This is especially relevant where the industry is dominated numerically by very small firms (mainly sole traders). The service can also be costly, the fee normally being based on the number of records supplied.

By contrast, enlisting the assistance of the farming unions can provide access to a large number of farmers with farm businesses of differing types and size. In common with many other organisations, the farming unions maintain membership lists to conduct their business. While these are confidential, it may be possible to arrange a survey to be conducted through the secretariat of the union. Such a postal survey is

likely reach a significant number of farms in a given geographical area, particularly if more than one union is involved. However, the need to cover the administrative costs of the union may mean that such a survey is expensive.

At first sight using a directory such as the Yellow Pages may appear to be an attractive alternative, in terms of its simplicity and low cost, to using a market research company or making an approach to the farming unions. Unfortunately, it can be problematic as there will be many farms in a given area that are not listed. This may mean that it is difficult to recruit a sufficiently large sample and the results may be biased.

Data collection

Once a sample of farmers has been recruited, two main methods are available to collect the required data. Either a postal survey can be used or, alternatively, data can be collected through personal interviews. While a postal survey offered the prospect of reaching a large number of subjects for a relatively low cost, potentially low response rates were a cause for concern. In the context of the current study there were additional concerns regarding the likely accuracy of the data being sought. This was particularly pertinent with respect to farm income (and other farm economic data) as it would be impossible to establish how any figures provided had been calculated or estimated.

Personal interviews offered the possibility of collecting more accurate data. However, the logistics, cost and time involved for a single researcher to visit geographically dispersed farms throughout Wales presented problems. Collection of farm income data would still have been difficult, in that accurate figures would only be possible through constructing a detailed financial record of the previous years farming activities. It was unlikely that farmers would be willing to spend the amount of time necessary to accomplish this, even if they were willing to provide such detailed information.

1.2.1.1 Solution adopted

The solution was to seek the assistance of Dr Tim Jenkins (Director, now retired) of the Farm Business Survey in Wales. The Farm Business Survey in Wales collects financial and physical data each year from a representative sample of farms in Wales on behalf of the Welsh Assembly Government. An exploratory meeting was held at the end of 2001 to discuss the feasibility of forwarding a health questionnaire to farm households

in Wales through the Farm Business Survey. After a further meeting and exchanges of correspondence, The Farm Business Survey in Wales agreed to deliver health questionnaire packs to farm households when conducting their annual farm visits during 2002. In addition, for each farm that returned a completed health questionnaire, the Farm Business Survey agreed to supply the corresponding farm physical and financial data. Securing the assistance of the Farm Business Survey in Wales addressed many of the more contentious issues outlined in Sections 1.3.1.1 and 1.3.1.2. The need to recruit and survey a sample of farmers was negated, while farm income (as well as other economic and physical) data supplied was collected to an established and proven methodology.

Survey procedure

Farm visits by the Farm Business Survey commence in January and continue until mid September each year. The health survey was conducted in 2002 commencing in February. The support of the main farming unions in Wales was sought and obtained at an early stage of the project. Both the Farmers' Union of Wales and National Farmers' Union Wales forwarded letters of support to the Farm Family Health Project.

Health questionnaire packs (comprising a questionnaire, a covering letter from the project team and a prepaid, preaddressed envelope) were delivered to the Farm Business Survey in Wales in early February 2002. There were two versions of the pack: one written in English and one in Welsh.

Investigational Officers delivered the packs to farms, leaving one or two packs depending on whether there was a spouse/partner in the farm household. In an attempt to increase the response rate, Investigational Officers were asked to introduce the study to farmers at the time of delivery. To assist them a number of supporting documents were supplied as A4 laminated sheets. These were an aide memoir in the form of a question and answer sheet and letters of support from both the Farmers' Union of Wales and the National Farmers' Union Wales.

A system was devised to satisfy two apparently paradoxical requirements: supply anonymity to respondents of the health survey, while ensuring that farm income data and health data could be matched. The system devised revolved around the unique numbers allocated to farms by the Farm Business Survey to identify their records. This Farm Number was inserted on the front of the health questionnaires at the time of delivery. The enclosed prepaid envelope was addressed to the Farm Family Health

Project at Bangor, who later passed on the Farm Number to the Farm Business Survey in Wales in order for physical/income data relating to the farm to be supplied. Farm data supplied to the Farm Family Health Project did not include any information that would allow the identification of any individual participant in the Farm Business Survey in Wales. The advantages of this system were:

(i)   Investigational Officers from the Farm Business Survey did not have access to any health data;

(ii) the Farm Family Health Project could not identify any individual participating in either the Farm Business Survey or the health survey;

(iii) farm physical/income data could be matched to the health data of farmers (and their spouses/partners where appropriate).

1.2.1.2 The questionnaire

Overall length and format

The questionnaire was designed to be as non-threatening and user-friendly as possible, taking into account the nature of the survey. Long questionnaires can adversely affect response rates (Edwards *et al.*, 2002). Conscious of this, it was necessary to find a satisfactory compromise between having a comprehensive questionnaire while restricting the overall length. The adopted format was a 12-sided, stapled, A4 booklet which allowed a wide range of questions to be asked. This had good spacing and a reasonably sized font.

Choice of health questionnaire instrument

A key decision regarding the survey was deciding which health questionnaire instrument should be included within the broader questionnaire that included demographic details of the respondent, illnesses suffered, and their utilisation of health services. Health questionnaire instruments used in published studies of the UK farming community prior to 2002 had been confined to the Hospital Anxiety and Depression Scale (HADS) (Eisner, 1998; Booth and Lloyd, 1999) and the 28-item version of the General Health Questionnaire (GHQ-28) (Booth and Lloyd, 1999), both of which concentrate purely on the mental health of respondents. However, it was felt that a questionnaire instrument that measured both physical and mental health would be more appropriate, preferably one that had been used in large scale population studies to provide population 'norms'. Norms are benchmark scores for the general population

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that have been established through a survey, which is usually sufficiently large-scale to allow analysis by sub-sample using various demographic variables. Two questionnaire instruments that met these criteria were considered: the EuroQol EQ-5D and the 36-itemed version of the Short Form Health Survey, known as SF-36.

The EuroQol EQ-5D is a short questionnaire instrument comprising of five questions, each with three responses, covering five dimensions of health (EuroQol, 2005). In addition there is a visual analogue scale (VAS), presented graphically as a thermometer, for respondents to indicate their present health status on a scale of between zero (worst imaginable) and one hundred (best imaginable). There are published population norms for the visual analogue scale. While the instrument has been extensively used to assess health outcomes in a clinical setting, it is less clear whether the questionnaire is sensitive enough to detect differences in the general population. For this reason the main five question component of the EQ-5D was not adopted by the present study. However, it was decided that the VAS would be included as it was easily answered by respondents and could provide an additional health measure.

The SF-36 is a clinically validated, multi-purpose, short-form health survey instrument with thirty-six questions (QualityMetric Inc, 2005). It has been widely used in health research with over 240 peer-reviewed articles to date covering the SF-36 and the shorter versions of the Short Form (QualityMetric Inc, 2005b). In addition to its widespread use and acceptability, the SF-36 offered the advantages of being both a generic measure (not condition specific) of health-related quality of life and one that could be self administered. The questions require respondents to circle their chosen response in each line.

The SF-36 exists in a number of different versions; the version used in this study was supplied under licence by QualityMetric Incorporated who currently have four versions of the SF-36: Versions 1 and 2 in both standard and acute forms. Version 2 differs from Version 1 in having an expanded set of responses for some questions, while the standard form of each uses a respondent recall period of four weeks and the acute form one week.

The availability of different versions of the SF-36 has been further expanded through its adaptation for use in different countries. A UK version was developed by Brazier *et al.* (1992); the main differences are the Anglicisation of some of the language and the alteration of a social functioning item in terms of position and coding

(Bowling, 1997). However, comparison of a table contained in Ware *et al.* (2000, pp3:13-3:17) outlining different SF-36 versions with the UK version of the SF-36 in Jenkinson *et al.* (1996, pp45-48), shows that the UK version was based on an earlier Developmental Version. The analysis and interpretation manual for the UK version (Jenkinson *et al.*, 1996) is also currently out of print with the website for the publication directing interested parties to the QualityMetric website (HSRU, 2005). This presented a dilemma in selecting the exact version to use in the study. Was it better to use the UK version, which was essentially a developmental version, or the more widely used US version? Intuitively, the UK version appealed, but given that many studies have used an Anglicised version of the US instrument, this study did the same and used Version 1 with the standard recall period of four weeks. Adopting the SF-36 for the present study was particularly attractive, as it allowed comparisons between the survey sample and the general population of Wales to be made through data from the Welsh Health Survey (NAfW, 1999).

1.2.2   Surveying attendees of the Royal Welsh Agricultural Show

A survey of attendees at the Royal Welsh Agricultural Show was planned to complement the survey of farm households conducted through the Farm Business Survey in Wales. Conducting a survey at an agricultural show offered the prospect of obtaining a large sample of farmers and the general public to interview in a highly cost-effective manner. A survey was conducted among attendees of the Royal Welsh Agricultural Show and the Anglesey County Show in 2002. The exercise was repeated in 2003 and 2004, though only using the Royal Welsh Agricultural Show.

Survey procedure

The methodology used by McGregor (McGregor *et al.*, 1995) and Boulanger (Boulanger *et al.*, 1998) was adapted to investigate the mental health of farmers and non-farmers at agricultural shows in Wales. The show surveys were conducted from the stand of the School of Agricultural and Forest Sciences from the University of Wales at Bangor. Show regulations restricted the physical area in which members of the public could be surveyed to the immediate vicinity of the stand. In view of this, researchers seeking respondents approached people passing the university stand at each of the shows and asked them whether they would be willing to participate in a survey

on employment and health. Those that consented were either interviewed by a researcher or given a questionnaire for self-completion and return on that day.

1.2.2.1 The questionnaire

Overall length and format

The questionnaire was designed to be as non-threatening and user-friendly as possible, in accordance with administering it at an agricultural show. A double sided A4 sheet was considered to be the maximum practical length. However, in year 2 of the survey a supplementary stress questionnaire was administered to rural self-employed respondents, while in year 3 a supplementary health question was administered to all respondents on a separate sheet.

All questionnaires were completed anonymously with no names being collected. Information relating to individual health and income is regarded by most people as being highly private, administration of a questionnaire in a public place means that the opportunity for complete privacy is compromised. Questions were therefore formulated accordingly. It was decided that income and marital status data would not be collected (although a question was included to enable the spouses/partners of farmers to be identified) and that ages would be grouped into categories. Similarly, information regarding location of home residence was designed to prevent a specific dwelling from being identified.

Choice of health questionnaire instrument

The choice of health questionnaire instrument was determined by a number of important criteria. The first of these was that the instrument had to be capable of being used to survey the general public at an agricultural show. Many instruments are designed for use among specific population groups or those with certain medical/psychiatric conditions, rendering them unsuitable for general survey work. Similarly, the use of some instruments may only be appropriate in a clinical setting. It was also important that the instrument was designed for self-completion and could be used in a single administration since any follow-up would not be possible. A further criterion related to the length of the instrument, which had to fit on a single side of A4 paper and be short enough to allow it to be read out to respondents if necessary. Finally, the issue of finance had to be considered and the need to secure the use of an established health questionnaire instrument within the funds available.

Numerous scales of psychological well-being have been devised, many aimed at detecting common psychiatric disorders such as anxiety/depression, dementia and mental confusion (Bowling, 1997). One of the major questionnaire instruments developed to measure mental well-being is the General Health Questionnaire (GHQ). The GHQ is based on experimental work that sought to identify features distinguishing psychiatric patients, as a class, from individuals in the community who considered themselves to be healthy. It focuses on the hinterland between psychological sickness and psychological health (Goldberg and Williams, 1988), concentrating on the broader components of psychological morbidity such as anxiety and depression (Bowling, 1997). Although the GHQ originally comprised of sixty items, known as GHQ-60, a number of short-item versions (12, 20, 28, and 30) are now available.

For the purposes of this study the twelve item version, GHQ-12, was selected. While the number of studies examining the sensitivity, validity and reliability of GHQ-12 has been relatively small, results show that it compares very favourably with longer versions of the GHQ (Goldberg and Williams, 1988). In addition, it satisfied all the practical criteria set out above.

1.3   Thesis Structure

Figure 1.3 shows diagrammatically the relationship between the research questions, conceptual framework and the thesis chapters.

Data sources

The research questions were addressed using three main sources of data. The first comprised of survey data collected at agricultural shows in Wales for three consecutive years (2002 to 2004), details of which can be found in Chapter 2. The second source of data was the main health survey which used a questionnaire instrument that was delivered to households in the Farm Business Survey in Wales. Full details of the survey are reported in Chapter 3. Finally, farm physical and financial data was supplied by the Farm Business Survey for farms from which a completed health questionnaire was received.

Thesis chapters

The thesis is divided into a total of 9 chapters. Chapter 2, which follows, looks at the first research question regarding whether the mental health of farmers and their

spouses/partners differs from that of the general population. It reports the results obtained from surveys of agricultural show attendees for three consecutive years (2002 to 2004). The primary questionnaire instrument used was the twelve itemed version of the General Health Questionnaire (GHQ-12).

Chapters 3 to 5 report on the results obtained from the main health survey conducted through the Farm Business Survey in Wales. The questionnaire instrument delivered to farm households included the thirty-six itemed version of the Short Form questionnaire (SF-36), which allowed physical and mental health scores to be compared to those obtained from the 1998 Welsh Health Survey (NafW, 1999). The results in this Chapter 3 focus on the socio-demographic variables of the survey sample. Chapters 4 and 5 are concise and report on specific aspects of the main health survey. The former reports on results obtained using the visual analogue scale (VAS), while the latter concentrates on a sub-sample of 70 couples who returned two completed health questionnaires. All three chapters seek to address research question 2 and provide a comparison to the health of the general population of Wales.

Chapter 6 reports the incidence of illness among respondents to the main health survey and compares them to those obtained from the 1998 Welsh Health Survey (NafW, 1999). It also reports the utilisation of health care services by farmers and their spouses/partners before looking at the barriers to accessing those services and the improvements desired by the survey sample. Research questions 3 and 4 are addressed by this chapter.

Chapter 7 uses data from the main health survey as well as farm physical and financial data from the Farm Business Survey. The data is used to investigate whether the health of farmers is related to the financial status of farms. Research question 5 is the focus of this chapter.

Chapter 8 addresses the question of whether the adoption of agri-environment schemes is related to the mental health of farmers. It uses data collected in the main health survey as well as farm physical data from the Farm Business Survey in Wales.

Finally, Chapter 9 draws together the different components of the study. The main findings from individual chapters are collated and discussed before considering the main strengths and weaknesses of the study. The implications for policy and recommendations for future research are then presented.

Figure 1.3 The structure and layout of the thesis.

Research question 1
Does the mental health of farmers and their spouses/partners differ from the general population?

Research question 2
How does the mental and physical health of farm families compare to the general population?

Research question 3
How does the incidence of illness among farm families and their utilisation of health care services compare to the general population?

Research question 4
What are perceived barriers to farmers and their spouses accessing health care services and what improvements would they like to see in health care service provision?

Research question 5
Is farmer physical and mental health related to farm financial status?

Research question 6
Is the adoption of agri-environment schemes related to farmers' mental health?

Agricultural show surveys
Survey of show attendees. Questionnaire instruments:
GHQ-12;
VAS;
Stress questionnaire.

Main survey
Health survey of farmers and farmers' spouses/partners who participate in the Farm Business Survey in Wales. Questionnaire instruments:
SF-36;
VAS.

Farm Business Survey data
Farm financial and physical data collected by the Farm Business Survey in Wales.

Chapter 2
A comparison of the mental health status of farmers with that of the general population: evidence gathered at agricultural shows in Wales.

Chapter 3
Results from a survey into the physical and mental health of farm families in Wales.

Chapter 4
Results from using a visual analogue scale in a survey looking at the health of farm families in Wales.

Chapter 5
Results from a survey into the physical and mental health of farm families in Wales: a sub-sample of farmers and their spouses.

Chapter 6
Illness and health care service utilisation among farm families in Wales.

Chapter 7
How is farmer health related to the financial status of farming? Findings from a survey of farming families in Wales.

Chapter 8
The effect of farmer mental health on adoption: the case of agri-environment schemes.

Chapter 9 – General discussion

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Chapter 2: A comparison of the mental health status of farmers with that of the general population: evidence gathered at agricultural shows in Wales

A comparison of the mental health status of farmers with that of the general population: evidence gathered at agricultural shows in Wales

2.0 Abstract

Adapting methodology used in previous studies, a survey was conducted at agricultural shows in Wales over three consecutive years, 2002-2004, to investigate the mental health status of attendees. The main aim of the study was to establish whether the mental health status of farmers and their spouses differed from that of the general population. The health questionnaire instrument selected was the twelve item version of the General Health Questionnaire (GHQ-12).

A total of 784 questionnaires were completed over the three years. Results showed that there were generally no statistically significant differences in GHQ-12 scores for respondents by gender, age, residency in Wales, urban/rural residency or occupational status. However, GHQ-12 scores for farmers and their spouses were statistically significantly higher than those for non-farming respondents for each of the three years. This was also the case when farmers and their spouses were compared with other rural residents.

Supplementary surveys were also conducted in two of the three years. In 2003, a supplementary stress survey was administered to farmers to determine the ranking of 32 different stressors. Results show that "adjusting to new government regulations and policies" was the highest ranked stressor among the sample of 81 farmers who took part. A supplementary health question in 2004 asked respondents to use a visual analogue scale to record their current health. No statistically significant differences in scores for respondents by sex, age, residency in Wales, urban/rural residency or occupational status were recorded.

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2.1 Introduction

Farming is a hazardous occupation. Data for 1998 to 2001 shows that farming had the second highest fatal injury rate for any occupation in the UK, only exceeded by the quarrying of stone, ore and clay (National Statistics, 2001). In the ten years to 2001, 437 workers and 74 members of the public were killed on farms as a result of accidents (National Statistics, 2001). Such statistics highlight the risk to farmers' physical health in their work.

However, much less attention has been paid to the mental health of farmers, resulting in a general paucity of literature on the subject (Hughes and Keady, 1996). The importance of mental health is emphasised in the World Health Organization's definition of health as, "...a state of complete physical, mental and social well-being..." (WHO, 2001). Mental health is a key component of overall health. Moreover, mental health is more than just the absence of mental disorder but is, "a state of well-being in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (WHO, 2001).

Studies in the UK (Booth and Lloyd, 1999), United States (Ragland and Berman, 1990-91) and Australia (Page and Fragar, 2002) have found that farming as an occupation is associated with an increased risk of suicide. In the UK, for the period 1979 to 1990, 526 farmers committed suicide with a further 190 farmers, horticulturalists and farm managers committing suicide between 1991 and 1996 (Hawton *et al.*, 1998). Although some other occupations (such as veterinary surgeons, pharmacists, and dentists) had a higher risk of suicide, the number of suicides was greatest among farmers (Hawton *et al.*, 1998). Psychological autopsies conducted on farmers who had committed suicide between 1991 and 1993 found that in 69% of cases there was evidence that the farmer had been suffering from a definite or probable mental disorder at the time of death (Hawton *et al.*, 1998).

Nevertheless, suicide is the extreme end of a continuum of psychological stress, distress and tragedy for individuals, their families and communities (Boulanger *et al.*, 1999b). It is the most serious manifestation of psychological illness and has been likened to the visible tip of a "stress iceberg" (Boulanger *et al.*, 1999b), where the much larger burden of distress remains hidden. From this it may be hypothesised that anxiety, stress and depression are likely to be widespread among farmers. The high suicide rate among farmers has therefore provided the impetus for research into farmer

stress (Kelly and Bunting, 1998). Although definitions of stress vary (Beehr, 1995) and measurement is problematic (Dougall and Baum, 2001), there is general agreement that, "stress is (or can be) adaptive, that it is associated with threatening or harmful events, and that it is typically characterised by aversive or unpleasant feelings and mood" (Dougall and Baum, 2001). More recently, the Centre for Stress Management has stated, "Stress occurs when pressure exceeds your perceived ability to cope" (Centre for Stress Management, 2004), while the Health and Safety Executive (HSE, 2004) has adopted, "the adverse reaction people have to excessive pressure or other types of demand placed on them", as its definition of stress. Prolonged stress may result in physical and mental health problems (Quine, 1998).

Studies investigating stress among farmers in the UK arose from research originally conducted in the United States. The farm crisis in the United States during the 1980s caused severe financial, psychological and social difficulties for many farmers and their families (Bultena et al., 1986). This prompted a number of studies that examined aspects of farm family health in the context of the crisis, including the causes and effects of stress experienced by farmers in their occupation (Belyea and Lobao, 1990; Davis-Brown and Salamon, 1987). A key study, in terms of future UK research and policy, by Eberhardt and Pooyan (Eberhardt and Pooyan, 1990) surveyed 1,400 farmers as part of the USA Farm Stress Survey to identify the most stressful aspects of farming. Their methodology was subsequently adopted (and adapted) by McGregor and colleagues (McGregor et al., 1995) to survey farmers attending agricultural shows in England and Scotland in 1994, with Boulanger and colleagues (Boulanger et al., 1999a) using the methodology to survey farmers attending the Royal Welsh Agricultural Show in 1998.

Nevertheless, while the studies by McGregor (McGregor et al., 1995) and Boulanger (Boulanger et al., 1999a) identified the main stressors acting on farmers in the UK, they did not provide any quantitative evidence concerning the health of farmers. Such evidence is rare, although a number of local, small scale studies are found in the grey literature, some of which are examined in Lobley et al. (2004). Exceptions include Booth and Lloyd (1999) and Thomas et al. (2003). Booth and Lloyd (1999) found high levels of occupational stress among farming families, while Thomas and colleagues reported a lower prevalence of psychiatric morbidity among farmers, though they were more likely to express the view that life was not worth living.

The current study, as part of the Farm Family Health Project in Wales, sought to adapt the methodology used by McGregor and Boulanger to investigate the mental health of farmers and non-farmers at agricultural shows in Wales. A survey was conducted among attendees of the Royal Welsh Agricultural Show and the Anglesey County Show in 2002. The exercise was repeated in 2003 and 2004, though only using the Royal Welsh Agricultural Show. The purpose of this chapter is to describe the research undertaken and its findings.

2.1.1 Objectives of the study

The study sought to provide empirical evidence concerning the mental health status of farmers compared to the general population. It was planned to complement a survey of farmers and their spouses/partners conducted through the Farm Business Survey in Wales in 2002, the results of which are reported elsewhere in this thesis. The specific aims of this survey were:

(i) to investigate whether the mental health of farmers and their spouses/partners differs from that of non-farmers in the general population;

(ii) to examine whether the mental health of farmers and their spouses/partners differs from that of other rural dwellers;

(iii) to determine whether the mental health of self-employed farmers differs from that of other rural dwellers who are self-employed.

2.2 Methodology

2.2.1 The survey

The prominence of the Royal Welsh Agricultural Show was a prime consideration in selecting it as the primary survey location; it offered the prospect of obtaining a large sample of farmers and the general public to interview in a highly cost-effective manner.

The show is organised by the Royal Welsh Agricultural Society as an annual event at the society's permanent show ground at Llanelwedd, Builth Wells in mid-Wales. Held in the third week of July, it regularly attracts in excess of 200,000 visitors over the four days that it runs with up to 7,000 livestock entries and over 1,000 trade stands (BBC, 2005). The show celebrated its centenary in 2004.

In year 1 of the survey (2002), because only two days of surveying were available at the Royal Welsh Agricultural Show, the survey was also conducted at the Anglesey County Show. This show, though much smaller than the Royal Welsh Agricultural Show, attracts in excess of 50,000 visitors over the two days that it is held.

The survey was conducted from the stand of the School of Agricultural and Forest Sciences from the University of Wales at Bangor. Show regulations restricted the physical area in which members of the public could be surveyed to the immediate vicinity of the stand. In view of this, researchers seeking respondents approached people passing the university stand at each of the shows and asked them whether they would be willing to participate in a survey on employment and health. Those that consented were either interviewed by a researcher or given a questionnaire for self-completion and return on that day.

2.2.2   The questionnaire

2.2.2.1 Design considerations

The questionnaire was designed to be as non-threatening and user-friendly as possible, in accordance with administering it at an agricultural show. The primary design considerations are listed below.

Overall length

A double sided A4 sheet was considered to be the maximum practical length. However, in year 2 of the survey a supplementary stress questionnaire was administered to rural self employed respondents, while in year 3 a supplementary question was administered to all respondents on a separate sheet.

Anonymity/privacy

All questionnaires were completed anonymously with no names being collected. Information relating to individual health and income is regarded by most people as being highly private, administration of a questionnaire in a public place means that the opportunity for complete privacy is compromised. Questions were therefore formulated accordingly. It was decided that income and marital status data would not be collected (although a question was included to enable the spouses/partners of farmers to be identified) and that ages would be grouped into categories. Similarly, information regarding location of home residence was designed to prevent a specific dwelling from being identified.

Ease of completion

Tick boxes were used wherever possible to enable quick completion by minimising the amount of writing necessary.

Choice of health questionnaire instrument

Numerous scales of psychological well-being have been devised, many aimed at detecting common psychiatric disorders such as anxiety/depression, dementia and mental confusion (Bowling, 1997). Nevertheless, there is considerable difficulty in differentiating "cases" and "normals" in the population since available data and clinical experience indicates that there is no sharp dichotomy between the two (Goldberg and Williams, 1988). Instead, psychiatric disturbance may be thought of as being distributed throughout the population in varying degrees of severity (Goldberg and Williams, 1988). One of the major questionnaire instruments developed to measure mental well-being is the General Health Questionnaire (GHQ).

The GHQ is based on experimental work that sought to identify features distinguishing psychiatric patients, as a class, from individuals in the community who considered themselves to be healthy. It focuses on the hinterland between psychological sickness and psychological health (Goldberg and Williams, 1988), concentrating on the broader components of psychological morbidity such as anxiety and depression (Bowling, 1997). Although the GHQ originally comprised of sixty items, known as GHQ-60, a number of short-item versions (12, 20, 28, and 30) are now available.

For the purposes of this study the twelve item version, GHQ-12, was selected. While the number of studies examining the sensitivity, validity and reliability of GHQ-12 has been relatively small, results show that it compares very favourably with longer versions of the GHQ (Goldberg and Williams, 1988). In addition, it also satisfied a number of important practical criteria. The first of these was that the instrument had to be capable of being used to survey the general public at an agricultural show. Many instruments are designed for use among specific population groups or those with certain medical/psychiatric conditions, rendering them unsuitable for general survey work. Similarly, the use of some instruments may only be appropriate in a clinical setting. It was also important that the instrument was designed for self-completion and could be used in a single administration since any follow-up would not be possible. A further criterion related to the length of the instrument, which

had to fit on a single side of A4 paper and be short enough to allow it to be read out to respondents if necessary. Finally, the issue of finance had to be considered and the need to secure the use of an established health questionnaire instrument within the funds available. A licence was obtained from Nfer-Nelson Publishing Company Ltd to allow 500 administrations of the GHQ-12 each year at a cost of approximately £130 (excluding VAT) per year. This was deemed to be an acceptable cost and within the available budget.

Language

The general paucity of questionnaire instruments that have been officially translated and validated in the Welsh language is an issue that confronts health researchers in Wales. Unfortunately, the GHQ-12 is one such instrument which awaits translation and validation in Welsh. The questionnaire was therefore produced in English and in year 1 the late decision to implement the survey also meant that only non-Welsh speaking interviewers were available. In years 2 and 3 Welsh speakers were recruited onto the survey team, enabling the questionnaire to be administered in Welsh where appropriate (although still using an English form).

Colour of paper

White paper is highly reflective and proved unpleasant to write on in bright sunlight. After Year 1 a parchment coloured paper was used for the questionnaire.

2.2.2.2 Information sought

The questionnaire was divided into two main sections corresponding to the two sides of the questionnaire sheet. In addition, there was a supplementary stress question sheet in year 2 and a supplementary health question sheet in year 3. Each main section and supplementary question sheet is outlined below.

Section one

The first section was used to collect background information about the respondent (gender, age, location of home residence), current employment status, and brief details of farming activities if appropriate. This part of the questionnaire underwent a small number modifications in year 2, reflecting experience gained in year 1. Alterations were confined to the omission/inclusion of questions and both version 1 (year 1) and

version 2 (years 2 and 3) may be viewed in Appendices 1.0 and 1.1. The main differences between version 1 and version 2 are:

(i)   a question asking respondents the age at which they were last in full-time education was omitted due to the unexpected confusion it caused among respondents;

(ii)   a question requesting the first five characters of a respondent's home postcode was replaced by one asking for the respondent's home county;

(iii)   additional questions were included to elicit information concerning part-time employment;

(iv)   a question asking about recently leaving agricultural employment was omitted due to lack of response;

(v)   a question asking about participation in agri-environment schemes replaced a previous question about farm decision-making responsibilities.

Section two

The second section of the questionnaire was used for the GHQ-12. The twelve items contained within GHQ-12 ask the respondent to compare their recent experience of symptoms and behaviour to their usual state on a four point scale of severity. Six items are positive and allow the following responses: "more than usual", "same as usual", "less than usual" or "much less than usual". The other items are negative with possible responses being: "not at all", "no more than usual", "rather more than usual" and "much more than usual". Respondents were instructed to underline or circle their chosen response in each line. A copy of GHQ-12 can be found in Appendix 1.2.

Supplementary stress question sheet

In year 2 a supplementary stress question sheet was administered to respondents who indicated that they were both rural residents (defined as selecting home location as either "village/hamlet" or "open countryside") and self-employed (with or without employees). The double-sided A4 sheet listed 32 statements concerning different aspects of owning/managing a business and invited respondents to assess the amount of stress each caused on a scale of 1 to 5, where 1 was "no stress" and 5 was "extreme stress". There was also an open question at the end inviting respondents to comment on any aspects of business/work and its effect on their health. The statements used closely followed those selected by McGregor *et al.* (1995) and Boulanger *et al.* (1999a)

in their earlier studies in order to facilitate comparisons. A copy of the question sheet may be found in Appendix 1.3.

Supplementary health question sheet

In year 3 a supplementary health question sheet was administered to all respondents. Comprising of a single question, it used a visual analogue scale to ask respondents to rate their current health state on a scale of zero to 100, where zero corresponds to the "worst imaginable health state" and 100 corresponds to the "best imaginable health state". The scale is vertically aligned and has equally spaced marks at intervals of one, from zero to 100. It is annotated at each extreme as outlined previously and respondents are asked to draw a line indicating their present health state. The instrument is easy to administer and provides an additional indicator of self-reported health.

2.3   Results

2.3.1   Sample size

The total number of usable questionnaires completed for each year of the survey is shown in Table 2.1. The variation in numbers of questionnaires completed between years is mainly due to differences in the number of survey days and the number of personnel deployed in surveying. In year 2 the higher number of completed questionnaires was achieved through an additional half day of surveying with almost twice the number of interviewer days compared to the other years. The apparent reduction in the number of questionnaires per interviewer day for year 2 can be explained by the exclusion of the 96 supplementary stress question sheets that were completed (each requiring about the same time to complete as the main questionnaire). The average number of questionnaires per interviewer day rises to 32.9 if these are included.

Table 2.1.   Total number of respondents for agricultural show surveys by year.

	Year 1	Year 2	Year 3
Total number of usable questionnaires completed	200	332	252
Survey days (number of calendar days)	3.0	3.5	3.0
Labour days (number of interviewer days)	6.0	13.0	7.5
Questionnaires per interviewer day	33.3	25.5	33.6

Table 2.2. Frequency distributions of selected demographic details for respondents to the agricultural show surveys, by year. n, number of respondents.

	Year 1		Year 2		Year 3	
	n	%	n	%	n	%
Gender of respondents						
Male	119	59.5	232	69.9	154	61.1
Female	81	40.5	99	29.8	97	38.5
Missing	0	0	1	0.3	1	0.4
Age of respondents						
16 – 24	11	5.5	11	3.3	16	6.3
25 – 34	24	12.0	47	14.2	34	13.5
35 – 44	39	19.5	75	22.6	49	19.4
45 – 54	49	24.5	81	24.4	55	21.8
55 – 64	50	25.0	65	19.6	58	23.0
65+	27	13.5	53	16.0	40	15.9
Country of residence						
Wales	172	86.0	268	80.7	201	79.8
Other	26	13.0	55	16.6	47	18.7
Missing	2	1.0	9	2.7	4	1.6
Residency location						
Urban (city/town centre)	13	6.5	34	10.2	27	10.7
Suburbs of town/city	17	8.5	46	13.9	31	12.3
Village/hamlet	54	27.0	113	34.0	91	36.1
Open countryside	116	58.0	139	41.9	102	40.5
Missing	0	0	0	0	1	0.4
Occupational status						
Employee	79	39.5	140	42.2	102	40.5
Self employed – employees	26	13.0	37	11.1	28	11.1
Self employed – no employees	47	23.5	88	26.5	51	20.2
Retired	26	13.0	55	16.6	50	19.8
Looking after family/home	9	4.5	5	1.5	7	2.8
Permanently sick/disabled	3	1.5	0	0.9	3	1.2
Seeking work	0	0	3	0.9	2	0.8
Full time education	10	5.0	4	1.2	9	3.6
Livelihood						
Farmers/spouses	78	39.0	127	38.3	82	32.5
Non-farmers	122	61.0	205	61.7	170	67.5
Total number of respondents	200		332		252	

2.3.2 Demographic frequencies

Gender of Respondents

Table 2.2 shows that for all three years a higher proportion of males were interviewed than females, with a high level of consistency shown for years 1 and 3 (59.5% and 61.1%) respectively. In year 2 the proportion of males interviewed rose to 69.9%.

Age of respondents

Table 2.2 shows the distribution of respondents by age for each year of the survey, while Table 2.3 ranks the percentage within each age category for each year (1 being the highest). It can be seen that the ranking was identical between years 1 and 3, while in year 2 the 35 to 44 and 45 to 54 age groups had a higher ranking (i.e. second and first respectively, as opposed to third and second for the other years) and the 55 to 64 age group a lower ranking (third as opposed to first). Nevertheless, the percentages were relatively consistent between the different years with little variation.

Table 2.3. Rankings for age categories of respondents to agricultural show surveys, by year (where 1 is the highest frequency and 6 is the lowest).

Age of respondents	Year 1	Year 2	Year 3
16 – 24	6	6	6
25 – 34	5	5	5
35 – 44	3	2	3
45 – 54	2	1	2
55 – 64	1	3	1
65+	4	4	4

Country of residence

This was determined from the response to the question asking respondents their partial home postcode (year 1), corresponding to Post Office designated postal sectors (Geoplan, 2004), or their home county (years 2 and 3). In year 1, given that postal sector areas do not correspond to county boundaries, it was necessary to decide how to allocate respondents from postal sectors straddling the English/Welsh border. The 18 respondents concerned were allocated to the country that comprised the majority of the postal sector area. Using this method the proportion of respondents living in Wales was 86% for year 1 and around 80% for years 2 and 3 (see Table 2.2). The higher figure for year 1 may reflect the allocation method described above.

Residency location

Respondents were asked to indicate one of four possible selections (see Table 2.2) that best described the location of their place of residence. The primary aim of this question was to ascertain whether respondents lived in a rural or urban environment.

While there have been many attempts at defining rurality there is no universally accepted definition (Gregoire and Thornicroft, 1998) and it is a subject that is still hotly debated (see Hodge and Monk, 2004 for a contemporary discussion of "rural" in the context of economics). The official definitions and indices that have been developed are generally too complicated and impractical to be used in a survey context. Examples include Cloke's index of rurality (Cloke, 1977; Cloke and Edwards, 1986) and the OECD definition which is based on population density (OECD, 1994). A quote from Gregoire and Thornicroft (1998, p.273) summarises the position and highlights the lack of homogeneity that can exist between rural areas:

> "There is no universally agreed definition of rurality. The concept encompasses ideas such as population density, social and physical environment and land use. What constitutes a rural environment is inevitably relative, particularly internationally – rurality in England is quite different to rurality in Australia."

For the purposes of the survey, respondent self-selection from a limited, but comprehensive, range of choices in a compact format (one question) was therefore adopted. Nevertheless, the limitations of this pragmatic approach are appreciated, particularly in a Welsh context where small market towns may be smaller in population size than, for example, some English villages.

The proportion of respondents selecting each location for years 2 and 3 shows very little variation. For year 1 a much greater proportion, 58% compared to around 40% for years 2 and 3, selected "open countryside" with each of the other locations reduced. The higher proportion of those selecting "open countryside" is partially explained by the greater proportion of respondents being connected with farming.

Table 2.4 presents the same data using only two classifications, rural and urban. These have been derived by including the responses "village/hamlet" and "open countryside" as rural and "urban (city/town centre)" and "suburbs of town/city" as urban. Using this method, over three-quarters of respondents for each year are classed as living in a rural location.

Table 2.4. Frequency distribution of rural and urban residency locations, by year.

	Year 1		Year 2		Year 3	
	n	%	n	%	n	%
Residency location						
Rural	170	85.0	252	75.9	193	76.6
Urban	30	15.0	80	24.1	58	23.0
Missing	0		0		1	0.4

Occupational status

A single question (two in year 1) was used to elicit the occupational status of respondents, with eight possible responses. The proportion of respondents selecting each category shows a relatively high degree of consistency between years (see Table 2.2). For each year the highest proportion of respondents classed themselves as "employees", followed by (in order): self employed (no employees), retired, self employed (with employees). The remaining categories covering those looking after the family/home, permanently sick/disabled, seeking work, or in full time education accounted for a relatively small proportion of respondents (between 4.5% and 11% depending on year).

Livelihood

As a primary aim of the study was to compare the health of farmers and their spouses to the general population, it was necessary to formulate and apply a decision rule to differentiate between the two. Respondents satisfying the following criteria were identified as "farmers/spouses":

(i)   all those indicating that they were the spouse of a farmer;

(ii)   all those who indicated that farming was their sole full-time occupation;

(iii) all those indicating that farming was their main part-time occupation.

It can be seen that the proportion of respondents classed as "farmers/spouses" is similar for years 1 (39.5%) and 2 (38.6%), but falls slightly in year 3 (32.5%).

2.3.3   Scoring the GHQ-12

Two main methods for scoring the GHQ-12 emerge from Goldberg and Williams (1988) (pp. 19-21): "GHQ scoring" and "Simple Likert". As outlined earlier, respondents were asked to compare their recent experience of symptoms and behaviour to their usual state on a four point scale of severity for six positive and six negative

questions. Moving from left to right across the page from low to high severity, the respective scores for each item response are 0-0-1-1 for GHQ scoring and 0-1-2-3 for the Likert method. Once the appropriate score has been allocated for each individual item they are summed, giving a single score with a possible minimum of zero for both methods and maximums of 12 for the GHQ scoring method and 36 for the Likert method. Higher scores indicate poorer mental health status with an increased probability that the respondent is a psychiatric case.

The Likert method (score range 0 to 36) has been adopted in this study for two main reasons. Firstly, it produces a less skewed score distribution (Goldberg and Williams 1988, pp. 63), and secondly it incorporates a measure of intensity in addition to the number of symptoms of psychiatric disorder (although the value of the former is questioned by Goldberg and Williams 1988, pp. 20).

2.3.4   Analysis of GHQ-12 scores

This section aims to explore in detail the mean GHQ-12 scores for a variety of respondent groups within the population samples for each year of the survey. Table 2.5 shows the mean and median GHQ-12 scores for all respondents for each year of the survey along with the Kolmogorov-Smirnov test values. The Kolmogorov-Smirnov significance scores indicate that the distribution of GHQ-12 scores is non-normal for each year of the survey. The histograms in Figure 2.1 illustrate this phenomenon for each year. A non-normal distribution suggests that non-parametric tests should be applied to the analysis of the results. Consequently the Mann-Whitney U test and Kruskal-Wallis test have been used as appropriate.

Table 2.5.   Mean GHQ-12 scores for all respondents for each year of the survey.

	Year 1	Year 2	Year 3
Mean	10.80	9.27	10.03
Median	10.00	9.00	10.00
Standard error of the mean	0.327	0.233	0.264
Standard deviation of mean	4.621	4.244	4.197
Kolmogorov-Smirnov significance	<0.001	<0.001	<0.001
Normal distribution	No	No	No

The main results are presented in two tables that follow. Table 2.6 shows the mean GHQ-12 scores for respondents presented by gender, age, country of residence, residency location, occupational status, and farming connection, while Table 2.7

summarises the statistical test results for these variables, indicating whether any differences in GHQ-12 scores are statistically significant. Each variable is subsequently examined in turn under its own subheading after considering the possible effects of the survey day on the results.

Table 2.6. Mean GHQ-12 scores using selected demographic variables for respondents to the agricultural show surveys, by year. s.e., standard error of the mean; n/a, not applicable (empty cell).

	Year 1		Year 2		Year 3	
	GHQ-12	s.e.	GHQ-12	s.e.	GHQ-12	s.e.
Gender of respondents						
Male	11.02	0.45	9.12	0.27	10.18	0.35
Female	10.48	0.46	9.59	0.44	9.75	0.41
Age of respondents						
18 – 24	9.55	0.92	8.36	0.66	10.50	1.16
25 – 34	10.67	0.96	9.09	0.51	9.79	0.56
35 – 44	11.64	0.86	9.85	0.58	11.96	0.77
45 – 54	11.69	0.74	8.90	0.35	9.58	0.45
55 – 64	10.58	0.59	10.22	0.64	8.95	0.50
65+	9.00	0.61	8.17	0.55	9.85	0.66
Country of residence						
Wales	10.77	0.36	9.09	0.24	10.15	0.31
Other	10.69	0.74	10.07	0.70	9.53	0.55
Residency location						
Urban (city/town centre)	8.92	1.20	9.88	0.87	10.33	1.15
Suburbs of town/city	10.12	0.74	8.96	0.55	10.90	0.80
Village/hamlet	10.69	0.57	9.13	0.38	9.14	0.37
Open countryside	11.16	0.46	9.32	0.37	10.48	0.40
Occupational status						
Employee	10.41	0.46	9.52	0.33	9.69	0.44
Self employed – employees	13.38	1.21	8.92	0.67	9.93	0.68
Self employed – no employees	10.77	0.71	9.66	0.48	10.49	0.49
Retired	9.38	0.68	7.73	0.46	9.86	0.60
Looking after family/home	11.78	1.33	14.60	4.43	8.86	0.63
Permanently sick/disabled	14.00	4.73	n/a		17.33	5.36
Seeking work	n/a		12.00	4.62	12.00	0.00
Full time education	9.20	0.94	7.25	0.48	10.56	1.51
Livelihood						
Farmers/spouses	12.03	0.58	9.94	0.41	10.52	0.36
Non-farmers	10.02	0.37	8.85	0.27	9.79	0.35

Figure 2.1. Frequency distribution of GHQ-12 scores for all respondents to the agricultural show surveys in (a) year 1 (2002), (b) year 2 (2003), and (c) year 3 (2004).
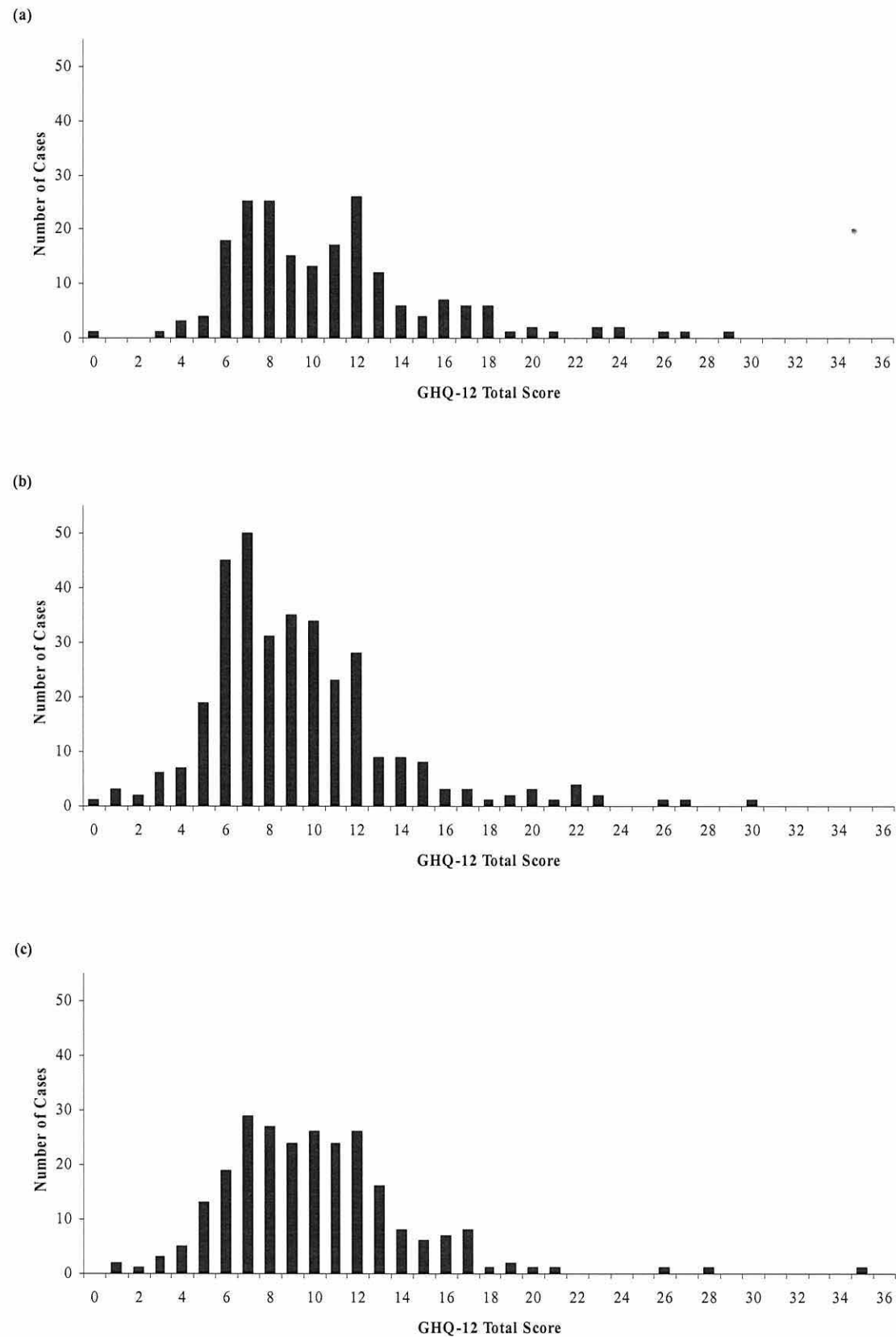
Table 2.7. Statistical tests on mean GHQ-12 scores of selected demographic variables for respondents of the agricultural show surveys, by year. Tests were undertaken between variables in each category (in bold) using a Mann-Whitney U test or Kruskal-Wallis test as appropriate.

	Year 1		Year 2		Year 3	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
Gender of respondents						
M-W Test (Asymp Sig 2-tailed)	0.930	No	0.230	No	0.639	No
Age of respondents						
K-W Test (Asymp Sig)	0.120	No	0.147	No	0.020	Yes*
Country of residence						
M-W Test (Asymp Sig 2-tailed)	0.647	No	0.267	No	0.397	No
Residency location						
K-W Test (Asymp Sig)	0.094	No	0.841	No	0.058	No
Occupational status						
K-W Test (Asymp Sig)	0.164	No	0.044	Yes*	0.173	No
Farm family						
M-W Test (Asymp Sig 2-tailed)	0.005	Yes**	0.025	Yes*	0.012	Yes*

Table notes
M-W Test: Mann-Whitney U Test.
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between GHQ-12 scores for groups within the variable concerned. 'No' indicates p>0.05.
**   Significant at the 1% level.
*   Significant at the 5% level.

Survey day

Table 2.8 shows selected information for each day of the survey over the 3 years that it was conducted. The Kruskal-Wallis test results, shown in the end column (K-W Sig), indicate that there is no statistical difference between mean GHQ-12 scores for the different survey days within each year. This means that the day of survey can be ruled out as a factor influencing the results in subsequent analyses.

Table 2.8. Statistical tests on mean GHQ-12 scores for all respondents for each survey day within each year of the survey.

	N	Mean GHQ-12 Score	Median	K-W Sig
Year 1				
Builth Wells – Day 1	59	11.25	10.00	
Builth Wells – Day 2	64	10.44	10.00	0.695
Anglesey	77	10.75	10.00	
Year 2				
Builth Wells – Day 1	99	9.56	9.00	
Builth Wells – Day 2	101	9.33	8.00	
Builth Wells – Day 3	83	9.16	8.00	0.452
Builth Wells – Day 4	49	8.73	9.00	
Year 3				
Builth Wells – Day 1	62	10.19	10.00	
Builth Wells – Day 2	78	9.71	9.00	0.627
Builth Wells – Day 3	112	10.16	10.00	

Table notes
K-W Test: Kruskal-Wallis Test.

Gender of Respondents

The results for the three years (Table 2.7) indicate that there was no statistically significant difference (p>0.05) between GHQ-12 scores for male and female respondents.

Age of respondents

There was a statistically significant difference between GHQ-12 scores for respondents by age group for year 3 (p<0.05), though not for the two previous years (Table 2.7). Examination of Table 2.6 shows that there is no clear trend with respect to GHQ-12 score and age group for year 3. The phenomenon can be attributed to the relatively high score for the 35 to 44 age group, which at 11.96 is the highest for any age group in any year.

Country of residence

There was no statistically significant difference (p>0.05) between GHQ-12 scores for respondents living in Wales compared to those living elsewhere (Table 2.7).

Residency location

Table 2.7 shows that there was no statistically significant difference (p>0.05) between GHQ-12 scores for respondents by residency location. This result is shown to hold when residency location is reclassified using the rural and urban descriptors as outlined above in section 2.3.2 (Table 2.9).

Table 2.9. Statistical tests on mean GHQ-12 scores for all respondents by urban and rural residency location for each year of the survey.

	Year 1		Year 2		Year 3	
	GHQ-12	s.e.	GHQ-12	s.e.	GHQ-12	s.e.
Residency location						
Urban	9.60	0.66	9.35	0.48	10.64	0.68
Rural	11.01	0.37	9.24	0.27	9.86	0.28
	Year 1		Year 2		Year 3	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
Residency location						
M-W Test (Asymp Sig 2 tailed)	0.176	No	0.992	No	0.531	No

Table notes
M-W Test: Mann-Whitney U Test.
Sig: Shows whether test result indicated statistically significant difference between GHQ-12 scores for groups within the variable concerned. 'No' indicates p>0.05.

Occupational status

There was a statistically significant difference between GHQ-12 scores for respondents by occupational status for year 2, though not for years 1 and 3 (Table 2.7). Examination of Table 2.6 shows that there is no clear trend with respect to GHQ-12 score and age group for year 2, although, the mean score of 14.60 for respondents "looking after family/home" (n = 5) was the highest for any group in the table and the score of 7.25 for "full-time education" (n = 4) was the lowest. However, the proportion of respondents falling into these categories was extremely small.

Table 2.10. Frequency distributions by occupational status for each year of the survey.

	Year 1		Year 2		Year 3	
	n	%	n	%	n	%
Occupational status						
Employee	79	39.5	140	42.2	102	40.5
Self employed – employees	26	13.0	37	11.1	28	11.1
Self employed – no employees	47	23.5	88	26.5	51	20.2
Non-working	48	24.0	67	20.2	71	28.2

Table 2.11. Mean GHQ-12 scores by occupational status for each year of the survey.

	Year 1		Year 2		Year 3	
	GHQ-12	s.e.	GHQ-12	s.e.	GHQ-12	s.e.
Occupational status						
Employee	10.41	0.46	9.52	0.33	9.69	0.44
Self employed – employees	13.38	1.21	8.92	0.67	9.93	0.68
Self employed – no employees	10.77	0.71	9.66	0.48	10.49	0.49
Non-working	10.08	0.57	8.40	0.56	10.23	0.54

Table 2.12. Statistical tests on mean GHQ-12 scores by occupational status for each year of the survey.

	Year 1		Year 2		Year 3	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
Occupational status						
K-W Test (Asymp Sig)	0.153	No	0.055	No	0.217	No

Table notes
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between GHQ-12 scores for groups within the variable concerned. 'No' indicates p>0.05.

Tables 2.10, 2.11 and 2.12 present the data using alternative categories for employment status. The eight categories presented in Tables 2.2 and 2.6 have been reduced to four by combining five former categories under the heading "Non-working" (i.e. those not in paid employment). Using this classification for respondents' employment status there was no statistically significant difference in GHQ-12 scores for any year.

Livelihood

The mean GHQ-12 scores for farmers/spouses were higher than those for non-farmer respondents for each year of the survey (Table 2.6). This indicates poorer mental health amongst farm families than the general population. Table 2.7 confirms that these differences are statistically significant (p<0.05) for each year of the survey. Figure 2.2 shows the frequency distributions of GHQ-12 scores for farmers and their spouses/partners compared to other respondents for each year of the survey. In years 1 and 2 the distribution of scores for farmers/spouses are broadly similar, with a long tail to the right in each case. In year 3, despite the highly significant difference in mean scores, the highest farmer/spouse score is 17 with all the higher scores being non-farming respondents. Table 2.13 summarises the frequencies of GHQ-12 scores for

farming and non-farming respondents where the score is equal to or greater than 18 (the middle point of the GHQ-12 Likert scale). It is interesting to note that in year 1, 59% of the high scores originated from farmers/spouses, falling to 50% in year 2 and zero in year 3. This is reflected in the proportion of all respondents scoring 18 or higher which fell progressively from 9% in year 1 to 3% in year 3.

Table 2.13. Frequency of GHQ-12 scores equal to 18 or higher, by farm family classification for each year of the survey.

GHQ-12 scores greater or equal to 18	Year 1	Year 2	Year 3
Total number of respondents	17	16	8
Total number as % of all respondents	9	5	3
Number of farm family	10	8	0
Number of farm family as % of all scoring over 18	59	50	0
Number of non-farming	7	8	8
Number of non-farming as % of all scoring over 18	41	50	100

Table 2.14 presents further comparisons between the GHQ-12 scores for farmers/spouses and non-farming respondents, using selected rural population groups for each year of the survey. The first comparison is between farmers/spouses, of whom 77 out of 78 are rural residents, and all other rural residents in the sample. The results show that there was a statistically significant difference in GHQ-12 scores for each of the three survey years. To investigate further, the sample was controlled for country of residency, whether respondents were in paid employment, and whether respondents were self-employed. This reduces the sample size in each case for both farmer/spouses and non-farming respondents, but particularly the latter where paid employment is used as a control since a relatively large group of retired respondents is excluded. Filtering the sample to remove non-residents of Wales preserves a statistically significant difference in years 1 and 3, but not in year 2. The same result emerges from just including those rural residents in paid employment. In the two remaining scenarios of "rural residents in paid employment in Wales" and "rural residents that are self-employed", only the results for year 1 indicate a statistically significant difference in GHQ-12 scores for farmer/spouses and non-farming respondents.

Figure 2.2. Frequency distribution of GHQ-12 scores for respondents by farm family classification in (a) year 1 (2002), (b) year 2 (2003), and (c) year 3 (2004).
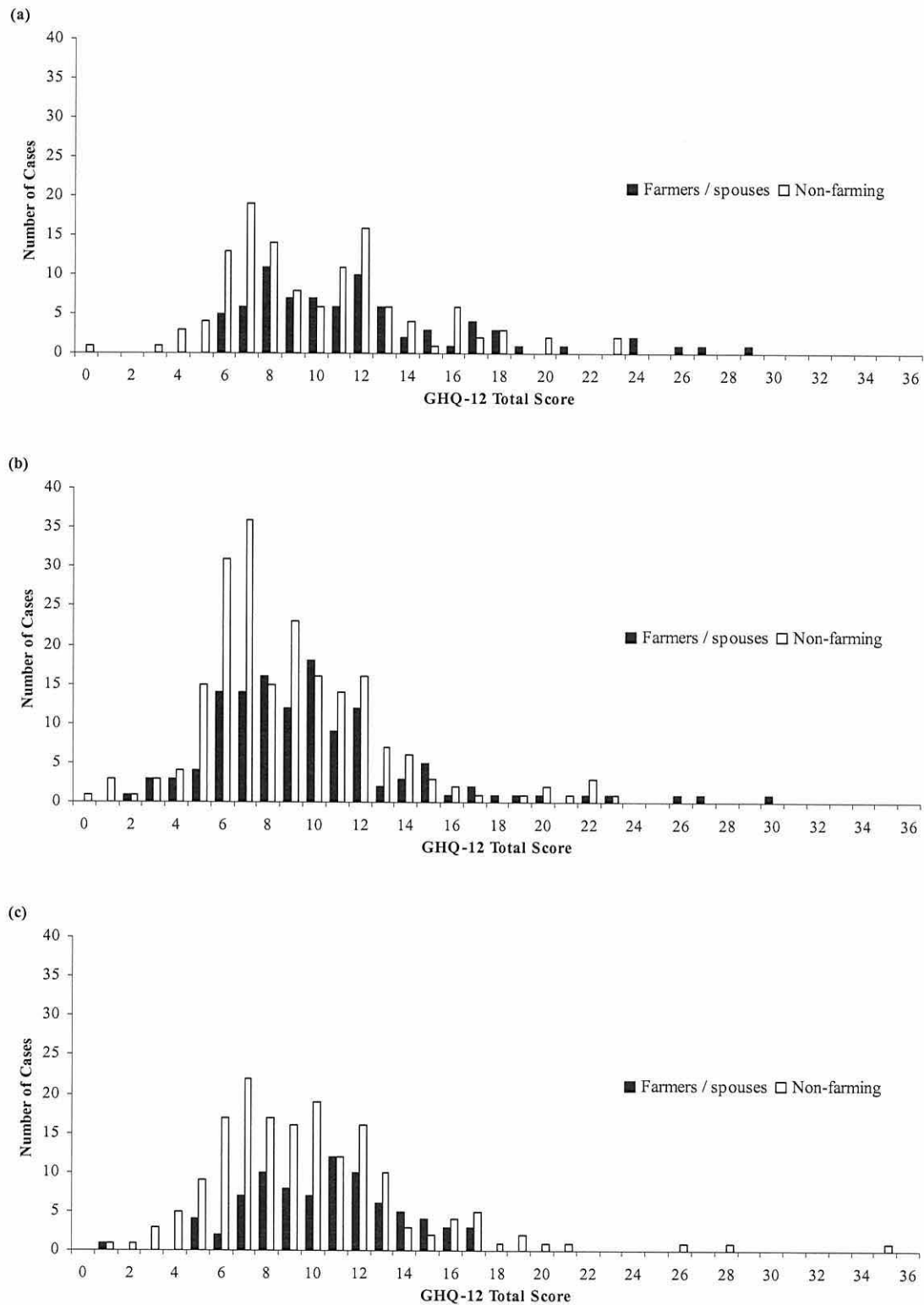
Table 2.14. GHQ-12 scores for farmers/spouses and non-farming respondents using selected rural population groups for each year of the survey.

	Year 1				Year 2				Year 3			
	n	Score	s.e.	Sig	n	Score	s.e.	Sig	n	Score	s.e.	Sig
Rural residents												
Farmers/spouses	77	12.04	0.584	Yes*	118	9.92	0.424	Yes*	77	10.39	0.364	Yes*
Non-farming	93	10.16	0.442		134	8.64	0.327		116	9.49	0.392	
Rural residents in Wales												
Farmers/spouses	72	12.06	0.606	Yes*	97	9.66	0.441	No	64	10.50	0.370	Yes*
Non-farming	82	10.10	0.480		108	8.72	0.361		90	9.63	0.478	
Rural residents in paid employment												
Farmers/spouses	70	12.01	0.631	Yes*	110	9.84	0.403	No	68	10.35	0.392	Yes*
Non-farming	65	10.08	0.535		99	8.96	0.397		73	9.16	0.430	
Rural residents in paid employment in Wales												
Farmers/spouses	66	11.97	0.652	Yes*	91	9.71	0.457	No	56	10.46	0.395	No
Non-farming	56	9.86	0.588		77	9.22	0.439		54	9.31	0.528	
Rural residents that are self-employed												
Farmers/spouses	52	12.52	0.790	Yes*	91	9.59	0.433	No	54	10.63	0.448	No
Non-farming	20	9.55	0.977		21	8.29	0.959		20	9.45	0.896	

Table notes

n: Number of respondents.

Score: Mean GHQ-12 score.

s.e.: Standard error of the mean GHQ-12 score.

Sig: Shows whether Mann-Whitney U Test (2-tailed) result indicated statistically significant difference between GHQ-12 scores for farming/non-farming respondents. 'No' indicates $p>0.05$.

* Significant at the 5% level.

2.3.5 Analysis of the farm data

In the previous section the analysis was presented by farm family classification where respondents belonged to one of two groups: farm family (farmers and farmers' spouses) or non-farming. To incorporate the farm data collected in the survey into the analysis, it was necessary to identify those respondents who were farmers (as opposed to farmer spouses). Table 2.15 shows the frequency distribution of farmers, farmers' spouses, and non-farming respondents for each year of the survey. The percentage of farmers as a proportion of the total number of respondents shows very little variation over the three years, ranging from 20.2% in year 3 to 27.4% in year 2.

Table 2.15. Frequency distribution of farmers, farmers' spouses, and non-farming respondents, for each year of the survey.

	Year 1		Year 2		Year 3	
	n	%	n	%	n	%
Farmers	46	23.0	91	27.4	51	20.2
Farmers' spouse	32	16.0	36	10.8	31	12.3
Non-farming	122	61.0	205	61.7	170	67.5
Totals	200	100.0	332	100.0	252	100.0

Table 2.16 shows the mean GHQ-12 scores for farmers, farmers' spouses and non-farming respondents. Given the results for farm family and non-farming respondents presented earlier, it is not surprising to find that farmers and their spouses have the highest scores, indicating poorer mental health, for each year of the survey. In year 1 farmers had the highest scores, in year 2 farmers' spouses were highest while in year 3 farmers and farmers' spouses were almost equal. Table 2.17 shows the results of a Kruskal-Wallis test in each year, indicating that the scores for the three groups were statistically significantly different in years 1 and 3, but not in year 2 ($p>0.05$).

Table 2.16. Mean GHQ-12 scores of farmers, farmers' spouses, and non-farming respondents for each year of the survey.

	Year 1		Year 2		Year 3	
	GHQ-12	s.e.	GHQ-12	s.e.	GHQ-12	s.e.
Farmers	12.78	0.85	9.66	0.44	10.53	0.47
Farmers' spouse	10.94	0.66	10.64	0.94	10.52	0.55
Non-farming	10.02	0.37	8.85	0.27	7.79	0.35

Table 2.17. Statistical tests on mean GHQ-12 scores of farmers, farmers' spouses, and non-farmer respondents for each year of the survey.

	Year 1		Year 2		Year 3	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
Occupational status						
K-W Test (Asymp Sig)	0.011*	Yes	0.069	No	0.043*	Yes

Table notes
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between GHQ-12 scores for groups within the variable concerned. 'No' indicates p>0.05.
*   Significant at the 5% level.

The farming data collected is presented under headings corresponding to the appropriate question in the questionnaire. Information sought covered: length of time working in agriculture, area of farm, type of farm, and agri-environmental scheme participation (years 2 and 3 only).

Length of time in agriculture

Respondents indicating that they were farmers were asked how many years they had been employed in agriculture. Responses varied from a few months to 65 years; the median figure for each year was 30 years. Table 2.18 shows that the mean figures for each year of the survey are also around 30 years. Table 2.19 shows the Spearman's non-parametric correlations for the length of employment in agriculture with GHQ-12 score for each year of the survey. None of these is statistically significant at either the 1% or 5% levels.

Table 2.18. Farmers' mean length of agricultural employment in years for each year of the survey.

	Year 1		Year 2		Year 3	
	mean	s.e.	mean	s.e.	mean	s.e.
Time in agriculture (years)	30.38	1.98	31.94	1.49	29.96	2.10

Tables 2.20, 2.21 and 2.22 show frequency distribution, GHQ-12 scores, and statistical test results respectively, where farmers' length of agricultural employment has been grouped into ten year periods. There are no clear patterns with respect to GHQ-12 scores and farmers' length of agricultural employment and no statistically significant differences (p>0.05) between GHQ-12 scores for the different employment time categories. This confirms the earlier correlation result and suggests that for this

sample of farmers there is no relationship between length of agricultural employment and mental health.

Table 2.19. Spearman's rho correlation coefficients for farmers' GHQ-12 scores and their length of agricultural employment for each year of the survey.

Variables	Time in agriculture	GHQ-12 Score
Year 1		
Time in agriculture	1.000	-
GHQ-12 Score	-0.051	1.000
Year 2		
Time in agriculture	1.000	-
GHQ-12 Score	0.137	1.000
Year 3		
Time in agriculture	1.000	-
GHQ-12 Score	-0.029	1.000

Table 2.20. Frequency distribution of farmers' length of agricultural employment for each year of the survey.

	Year 1		Year 2		Year 3	
	$\underline{n}$	%	$\underline{n}$	%	$\underline{n}$	%
Time employed in agriculture						
10 years or less	3	6.5	8	8.8	6	11.8
11 – 20 years	10	21.7	14	15.4	11	21.6
21 – 30 years	10	21.7	25	27.5	14	27.5
31 – 40 years	15	32.6	23	25.3	11	21.6
41 – 50 years	5	10.9	14	15.4	4	7.8
Over 50 years	2	4.3	7	7.7	5	9.8
Missing	1	2.2	0	0	0	0

Table 2.21. Farmers' mean GHQ-12 scores by length of agricultural employment for each year of the survey.

	Year 1		Year 2		Year 3	
	GHQ-12	s.e.	GHQ-12	s.e.	GHQ-12	s.e.
Time employed in agriculture						
10 years or less	8.00	0.58	7.13	0.93	11.17	0.75
11 – 20 years	11.20	1.18	9.14	0.99	10.55	1.11
21 – 30 years	17.60	2.54	10.00	0.72	10.50	0.64
31 – 40 years	13.20	1.18	9.17	0.62	10.55	1.56
41 – 50 years	10.00	2.03	10.93	1.43	11.25	1.60
Over 50 years	8.00	0.00	11.43	3.05	9.20	1.11

Table 2.22. Statistical tests on farmers' mean GHQ-12 scores by length of agricultural employment for each year of the survey.

	Year 1		Year 2		Year 3	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
Occupational status						
K-W Test (Asymp Sig)	0.052	No	0.448	No	0.887	No

Table notes
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between GHQ-12 scores for groups within the variable concerned. 'No' indicates p>0.05.

Farm size

Farmers were asked on the survey questionnaire to indicate the area that they farmed, in either acres or hectares. Responses were converted to hectares and mean farm areas for each year of the survey are presented in Table 2.23. The mean area of farms increased between years 1 and 3, though the relatively large standard error figures indicate a wide variation in farm sizes. Table 2.24 shows Spearman's non-parametric correlations for farm area and farmers' GHQ-12 scores for each year of the survey. While the correlations are all positive, with the figures for years 1 and 3 being similar, only in year 1 is the correlation statistically significant (p<0.05).

Table 2.23. Mean farm areas in hectares for each year of the survey.

	Year 1		Year 2		Year 3	
	mean	s.e.	mean	s.e.	mean	s.e.
Farm size (hectares)	96.40	13.33	135.06	16.43	184.37	30.61

Table 2.24. Spearman's rho correlation coefficients for farmers' GHQ-12 scores and farm area for each year of the survey. * Correlation is significant at the 0.05 level (2-tailed).

Variables	Farm Area	GHQ-12 Score
Year 1		
Farm Area	1.000	-
GHQ-12 Score	0.380*	1.000
Year 2		
Farm Area	1.000	-
GHQ-12 Score	0.042	1.000
Year 3		
Farm Area	1.000	-
GHQ-12 Score	0.310	1.000

Tables 2.25, 2.26 and 2.27 show the frequency distribution, GHQ-12 scores and statistical test results respectively, where farm size has been grouped into fifty hectare categories. In year 1 the positive correlation, already established (Table 2.24), between farm size and GHQ-12 score can be seen in Table 2.26, although there are only a small number of farms in the largest categories. The relatively high, though not statistically significant, correlation for year 3 can also be seen in Table 2.26. Table 2.27 shows that there was no statistically significant difference between the farm size categories.

Table 2.25. Frequency distribution of farms, by area, for each year of the survey.

	Year 1		Year 2		Year 3	
	n	%	n	%	n	%
Farm size (hectares)						
50 or less	16	34.8	21	23.1	11	21.6
51 – 100	10	21.7	27	29.7	8	15.7
101 – 150	9	19.6	22	24.2	15	29.4
151 – 200	4	8.7	8	8.8	3	5.9
201 – 250	3	6.5	2	2.2	2	3.9
Over 250	1	2.2	11	12.1	11	21.6
Missing	3	6.5	0	0	1	2.0

Table 2.26. Farmers' mean GHQ-12 scores by farm area for each year of the survey.

	Year 1		Year 2		Year 3	
	GHQ-12	s.e.	GHQ-12	s.e.	GHQ-12	s.e.
Farm size (hectares)						
50 or less	10.75	1.07	9.90	0.71	10.45	1.04
51 – 100	12.00	1.89	7.78	0.51	9.13	1.42
101 – 150	14.89	2.19	11.27	1.23	10.33	0.75
151 – 200	16.50	3.52	10.38	1.92	11.00	2.52
201 – 250	15.33	5.90	8.00	2.00	13.50	2.50
Over 250	15.00	-	10.36	1.08	11.36	1.04

Table 2.27. Statistical tests on farmers' mean GHQ-12 scores by farm area for each year of the survey.

	Year 1		Year 2		Year 3	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
Farm area						
K-W Test (Asymp Sig)	0.401	No	0.075	No	0.771	No

Table notes
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between GHQ-12 scores for groups within the variable concerned. 'No' indicates p>0.05.

Farm type

Farmers were asked to select one of nine types of farm that most accurately described their farm business. Over 80% of the farmers that completed a questionnaire in each year of the survey were residents of Wales. The frequency distribution of farm types shown in Table 2.28 appears to reflect this, with the largest groups being either "mainly sheep" (year 1) or "mixed livestock" (years 2 and 3). Table 2.29 reports the mean GHQ-12 scores for farmers' of each farm type, with no clear pattern being apparent. The Kruskal-Wallis test results shown in Table 2.30 confirm that differences in GHQ-12 scores between groups were not statistically significantly different ($p > 0.05$).

Table 2.28. Frequency distribution of farm types for each year of the survey.

	Year 1		Year 2		Year 3	
	n	%	n	%	n	%
Farm type						
Mixed arable and livestock	8	17.4	15	16.5	12	23.5
Mixed livestock	6	13.0	49	53.8	18	35.3
Mainly arable	0	0	1	1.1	1	2.0
Mainly sheep	16	34.8	10	11.0	7	13.7
Mainly dairy	9	19.6	11	12.1	3	5.9
Mainly beef	1	2.2	3	3.3	2	3.9
Poultry	4	8.7	1	1.1	0	0
Pigs	0	0	0	0	0	0
Other	0	0	1	1.1	8	15.7
Missing	2	4.3	0	0	0	0

Table 2.29. Farmers' mean GHQ-12 scores by farm type for each year of the survey.

	Year 1		Year 2		Year 3	
	GHQ-12	s.e.	GHQ-12	s.e.	GHQ-12	s.e.
Farm type						
Mixed arable and livestock	15.88	2.75	8.60	0.51	10.67	0.96
Mixed livestock	15.50	2.01	9.82	0.67	10.00	0.61
Mainly arable	-	-	7.00	-	16.00	-
Mainly sheep	11.38	1.14	11.70	1.08	11.57	1.54
Mainly dairy	13.11	2.33	9.73	1.53	9.33	0.33
Mainly beef	6.00	-	8.00	1.00	11.50	0.50
Poultry	9.75	0.63	12.00	-	-	-
Pigs	-	-	-	-	-	-
Other	-	-	2.00	-	10.13	1.78

Table 2.30. Statistical tests on farmers' mean GHQ-12 scores by farm type for each year of the survey.

	Year 1		Year 2		Year 3	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
Farm type						
K-W Test (Asymp Sig)	0.195	No	0.202	No	0.695	No

Table notes
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between GHQ-12 scores for groups within the variable concerned. 'No' indicates p>0.05.

Agri-environmental scheme participation

In years 2 and 3 respondents who were farmers were asked to indicate which, if any, agri-environment schemes they had joined and Table 2.31 shows the resulting frequency distributions. Adopters of agri-environment schemes constituted 43% and 45% of farmer respondents respectively for years 2 and 3. Table 2.32 shows that GHQ-12 scores for adopters were slightly lower, indicating better mental health, than those for non-adopters in year 2, while in year 3 adopters had fractionally higher GHQ-12 scores. The Mann-Whitney test results reported in Table 2.33 indicate that differences in GHQ-12 scores for adopters and non-adopters of agri-environment schemes were not statistically significantly different for either year.

Table 2.31. Frequency distribution of agri-environment scheme participation for years 2 and 3 of the survey.

	Year 1		Year 2	
	n	%	n	%
Agri-environment schemes				
Tir Gofal	20	22.0	9	17.6
Tir Cymen	6	6.6	1	2.0
Environmentally Sensitive Areas	10	11.0	9	17.6
Other schemes	3	3.3	4	7.8
Non-adopters	52	57.1	28	54.9

Table 2.32. Farmers' mean GHQ-12 scores for adopters and non-adopters of agri-environment schemes for years 2 and 3 of the survey.

	Year 1		Year 2	
	GHQ-12	s.e.	GHQ-12	s.e.
Agri-environment schemes				
Adopters	9.15	0.60	10.57	0.70
Non-adopters	10.04	0.63	10.53	0.64

Table 2.33. Statistical tests on farmers' mean GHQ-12 scores for adopters and non-adopters of agri-environment schemes for years 2 and 3 of the survey.

	Year 1		Year 2	
	Statistic	Sig	Statistic	Sig
Agri-environment schemes				
M-W Test (Asymp Sig 2 tailed)	0.473	No	0.739	No

Table notes
M-W Test: Mann-Whitney U Test.
Sig: Shows whether test result indicated statistically significant difference between GHQ-12 scores for groups within the variable concerned. 'No' indicates p>0.05.

2.3.6   Supplementary question sheets

2.3.6.1 Stress survey

Method

In year 2 (2003), the survey was used to investigate whether the main stressors affecting farmers had changed since the surveys conducted by McGregor and Boulanger in 1994 and 1998 respectively (McGregor *et al.*, 1995; Boulanger *et al.*, 1999a). Respondents indicating that they were either (a) farmers or, (b) running a rural based (non-farming) business, were invited to complete a supplementary question sheet. This presented a list of 32 potential stressors and asked respondents to indicate the level of stress caused by each stressor on a scale of 1 (representing no stress) to 5 (representing extreme stress). From these a mean score for each stressor was calculated, enabling the stressors to be ranked and a comparison to be made with previous studies.

Response

A total of 96 supplementary question sheets were completed by respondents, generating 88 usable forms. Most of the excluded forms related to either retired farmers or to respondents that farmed as a secondary occupation. Table 2.34 shows that 121 respondents were eligible to complete a stress questionnaire. While the response from farmers was excellent at 89%, the response rate from respondents running rural (non-farming) businesses was only 23%. Given the very low number of stress forms completed for non-farming rural businesses, results are presented only for farmers.

Table 2.34. Number of respondents completing a stress questionnaire in year 2 (2003).

	Respondents eligible to complete stress form:		
	All	(a) Farmers	(b) Rural, self-employed (non-farm)
Totals	121	91	30
Stress sheets completed	88	81	7
Response rate (%)	73	89	23

Results

Table 2.35 shows the 32 stressors included in the survey along with their respective mean scores. These have been ranked in order of mean score, the highest score indicating the stressor that causes most stress to farmers. To enable comparison with previous studies the rankings obtained for these have been included in adjacent columns. Two stressors, "worrying about the public image of my industry" and "worried about overseas competition", included in the 2003 study did not feature in the 1994 and 1998 studies. Similarly, there are three stressors, listed at the end of Table 2.35, that appeared in the 1994 study that were not included in either the 1998 or 2003 studies. There are also two instances where two stressors used in the 1994 study were combined in the 1998 and 2003 studies, hence the dual ranking figures in the 1994 column for "uncertainty about weather conditions" and "worrying about owing money". Nevertheless, there is a high degree of consistency in the stressors included in the three studies.

The highest ranked stressor in the 2003 survey was "adjusting to new government regulations and policies", which was also ranked 1 in the 1998 study (Boulanger *et al.*, 1999a) and 3 in the 1994 (McGregor *et al.*, 1995). Similarly, "filling in government forms" ranked at 2 in 2003 was also ranked at 2 in 1998 and 1 in 1994. The third highest score in 2003 was for "too much to do and too little time to do it", which was ranked 6 in 1994 and 1998. The next two most highly ranked stressors in 2003 show a reasonably high degree of consistency in their positions with those for the earlier studies. "Equipment breakdown at busy times" features as being ranked 4 or 5 for all the studies, while "complying with environmental regulation" was ranked 5 in 2003 and 1994, but only 10 in 1998. In fact, a comparison of the top ten stressors in 2003 with the previous studies shows that seven appear in the top ten for 1998 and seven (some different to 1998) appear in the top ten for 1994, although the ordering differed for both the previous years.

At the bottom of the table, the stressor in 2003 that least concerned farmers was "lack of close neighbours" (lowest score), which is consistent with both the 1998 and 1994 studies. In fact, out of the five stressors appearing at the bottom of Table 2.35 for 2003, four are to be found in the bottom four positions of the other two studies.

Discussion

Despite a significantly reduced sample size, the results from the 2003 study are highly consistent with the results from the earlier studies. The two stressors causing the most stress to farmers in the 2003 survey are the same as those recorded in the 1998 study which was also conducted at the Royal Welsh Agricultural Show. These two also appear in the top three stressors of the 1994 study. This suggests that overall little has changed in respect of the main causes of stress to farmers, with regulation and bureaucracy ranked highest. It would appear that this situation is unlikely to change in the immediate future. The 2003 Common Agricultural Policy reform, with the introduction of the new Single Farm Payment, heralds a further period of farmers filling in forms and having to adjust to new regulations.

With respect to those stressors at the bottom of Table 2.35, there is a remarkably high degree of consistency in the stressors that feature in the three studies. The rankings suggest that isolation and lack of neighbours are not a cause of stress to farmers. However, McGregor *et al.* (1995) and Boulanger *et al.* (1999a) both acknowledge that this may be because farmers travelling to a show are those most likely to leave the farm more regularly and therefore have more outside contact with people.

Conclusion

Over the course of ten years, remarkably little seems to have changed with regard to the main causes of stress to farmers. It remains to be seen whether the introduction of the Single Farm Payment will ultimately simplify the subsidy system sufficiently to relieve farmers of some of the legislative and bureaucratic burden they currently bear.

Table 2.35. Results from the stress survey in year 2 (2003) showing mean scores for the 32 stressors and ranked in order of score (highest first), with rankings from previous studies shown for comparison.

Stressors	Score 2003[1]	Rankings 2003[1]	Rankings 1998[2]	Rankings 1994[3]
Adjusting to new government regulations and policies	3.47	1	1	3
Filling in government forms	3.28	2	2	1
Too much to do and too little time to do it	3.12	3	6	6
Equipment breakdown at busy times	2.91	4	5	4
Complying with environmental regulations	2.83	5	10	5
Not enough ready cash	2.72	6	3	11
Changes in European policy	2.68	7	9	7
Long hours of work	2.67	8	11	10
Worrying about the public image of my industry	2.56	9		
Unplanned interruptions	2.44	10	16	13
Worrying about continued viability of business	2.43	11	7	12
Making major purchases for the business	2.42	12	18	14
Taking few holidays away from the business	2.41	13	20	15
Worrying about market conditions	2.36	14	4	16
Uncertainty about weather conditions	2.35	15	8	2,8
Financing my retirement	2.26	16	13	25
Significant production loss due to disease/pests/weeds	2.21	17	12	22
Problems balancing work and family duties	2.11	18	21	17
Risk of work related injury	2.09	19	25	29
Keeping up with new technology and procedures	2.07	20	23	21
Personal illness during busy times	2.06	21	17	24
Deciding when to sell produce/goods	2.01	22	22	23
Worried about overseas competition	1.98	23		
Worrying about keeping business in the family	1.98	23	14	26
Worrying about owing money	1.89	25	15	18,19
Having no help with the business	1.83	26	24	28
Use of hazardous materials at work	1.73	27	26	27
Not seeing enough people from day to day	1.70	28	29	33
Not being free to make my own decisions at work	1.64	29	19	30
Feeling isolated at work	1.58	30	28	32
Having to travel long distances for services	1.49	31	27	34
Lack of close neighbours	1.47	32	30	35
Increased work load at peak times				9
Having to make decisions without the necessary information				20
Farming related accidents				31

[1] Ranking from survey at Royal Welsh Agricultural Show in 2003.
[2] Ranking from Boulanger et al., 1999a (survey at Royal Welsh Agricultural Show in 1998).
[3] Ranking from McGregor et al., 1995 (survey at Royal Show and Highland Show in 1994).

2.3.6.2 Health survey

Method

In year 3 (2004) the survey included a single supplementary health question on a separate sheet asking respondents to rate their current health using a visual analogue scale (VAS). A visual analogue scale (EuroQol, 2005) was obtained from the EuroQol EQ-5D health measurement instrument and incorporated into the Farm Family Health Project health survey questionnaire. The EQ-5D is a public domain questionnaire that can be used royalty free for non-commercial research (EuroQol, 2005). The VAS comprises of a vertical line marked at equally spaced intervals from zero to 100, resembling a thermometer in appearance (Figure 2.3). Respondents were instructed to indicate their current health by drawing a line to the appropriate point on the scale, where zero represented the worst health state imaginable and 100 the best.

Results

The Spearman's correlation between scores recorded on the visual analogue scale and GHQ-12 scores was -0.225 ($p<0.01$). The significant negative correlation is as expected given that higher scores on the VAS indicate better health, while lower scores on the GHQ-12 indicate better mental health. The VAS is likely to be recording a combination of mental and physical health for respondents. Although respondents are likely to primarily base their assessment on their physical health state this will be influenced and filtered to some extent by how they are feeling and their perception of their health.

Table 2.36 presents mean VAS scores by the same demographic variables used to assess GHQ-12 scores, showing that the mean score for all respondents was 77.65. As indicated in Table 2.36, none of the variables shows a statistically significant difference for the VAS scores of respondents. The mean scores for most groups show very little variation, with the exception of those for occupational status. It is interesting to note the relatively high score for those seeking work, while those recorded as permanently sick/disabled have much lower scores as would be expected. However, the numbers in both these groups were extremely small.

Figure 2.3. The Visual Analogue Scale (VAS) used in the health survey. Source: EuroQol, 2005.

Best imaginable health state

Valuing your own health today

Please indicate on this scale how good or bad your own health is today.

- The best health state you can imagine is marked 100 and the worst health state you can imagine is marked 0.

- Please draw a line from the box below to the point on the scale that indicates how good or bad your health state is today.

1 0 0

9 0

8 0

7 0

6 0

Your own health state today

5 0

4 0

3 0

2 0

1 0

0

Worst imaginable health state

Table 2.36. Mean scores from the visual analogue scale using selected demographic variables for respondents for year 3 of the survey.

		Year 3			
	n	mean score	s.e.	Statistic	Sig
Gender of respondents					
Male	154	78.48	1.280	0.265	No
Female	97	76.42	1.667		
Age of respondents					
18 – 24	16	77.88	2.764		
25 – 34	34	79.15	2.441		
35 – 44	49	75.94	2.733	0.919	No
45 – 54	55	77.60	2.194		
55 – 64	58	76.88	2.031		
65+	40	79.60	2.582		
Country of residence					
Wales	197	77.68	1.198	0.375	No
Other	47	79.30	1.567		
Residency location					
Urban (city/town centre)	27	74.81	3.23		
Suburbs of town/city	31	78.84	2.847	0.774	No
Village/hamlet	91	77.84	1.642		
Open countryside	102	77.72	1.628		
Occupational status					
Employee	102	78.26	1.372		
Self employed – employees	28	77.86	3.586		
Self employed – no employees	51	78.02	2.100		
Retired	50	77.06	2.566	0.359	No
Looking after family/home	7	71.86	6.277		
Permanently sick/disabled	3	56.67	24.037		
Seeking work	2	97.50	2.500		
Full time education	9	78.44	3.300		
Farm family					
Farmers/spouses	82	77.01	1.894	0.961	No
Non-farming	170	77.96	1.194		
Overall					
All respondents	252	77.65	1.012		

Table notes
s.e.:   Standard error of the mean.
Statistic: Mann-Whitney U Test or Kruskal-Wallis Test, as appropriate.
Sig: Shows whether test result indicated statistically significant difference between VAS scores for groups within the variable concerned. 'No' indicates $p > 0.05$.

2.4   Discussion

The main objective of this study was to investigate whether the mental health of farmers and their spouses is worse than that of the general population. The results presented above in Tables 2.5 and 2.6 indicate that the mean GHQ-12 scores for farmers and their spouses were higher, indicating poorer mental health, than those for non-farming respondents for each of the three survey years. Moreover, these differences were statistically significant for each of the three years. Other demographic variables considered, such as gender, age, being a resident of Wales, residency location and employment status appear to be generally unrelated to the mental health status of the respondents in this survey. This suggests that the farming connection may be the important factor influencing mental health status. However, examination of the farm data collected does not reveal any apparent relationship between the mental health of farmers in the sample to their time in agricultural employment, or to the type or size of farm they operate.

The comparison between farmers and other rural dwellers is less clear. Comparing the GHQ-12 scores for farmer/spouses with other rural residents gives a statistically significantly result for each year. This suggests that farming families are a distinct group within the broader group of rural residents in terms of mental health status. However, when focusing on residents of Wales and those in paid employment, statistically significant results are only maintained in two out of the three years. Restricting the sample to those in paid employment and in Wales, or to those who are self-employed, reduces the number of statistically significant results still further. This suggests, paradoxically, that farm families in Wales do not differ significantly in terms of mental health status to the other rural residents living around them. The situation, given the assertions made earlier about the lack of apparent effect of demographic variables on mental health status, is far from clear.

The poorer mental health status found among farming families compared to others is, on one hand, not surprising given recent events and trends in the agricultural sector. The foot and mouth crisis of 2001, downward pressure on prices for farm output, low incomes and reform of the agricultural support regime are all likely to have contributed to the worries and concerns of farmers in recent years. However, it is interesting that this difference in mental health status has been detected through surveying attendees of agricultural shows. It might be supposed that farmers who are more outgoing and less anxious/depressed would be more likely to attend agricultural

shows. This bias in the sample suggests that the true level of psychiatric morbidity among the farming community maybe much higher than these figures suggest.

Nevertheless, caution should be exercised in interpreting results from a single instrument with a relatively small sample size. The GHQ-12 concentrates on breaks in normal function rather than lifelong traits (Goldberg and Williams, 1988) and is sensitive to very transient disorders. In a survey among the general public where the prevalence of psychiatric disorder is likely to be low, this means that there is an increased risk of false positives. However, the questionnaire is also likely to miss very long-standing disorders. This is because respondents answer "same as usual" or "no more than usual", resulting in a low score, although Goldberg and Williams (1988) point out that this effect is less than that theoretically suggested as patients cling to a concept of their "usual self" as being without symptoms. It is difficult to assess accurately the effects of these characteristics of the GHQ-12 since they will apply to both farmers/spouses and non-farming respondents.

A further factor that may distort the survey results is that many non-farming respondents at the Royal Welsh Agricultural Show will be on holiday, as it coincides with the beginning of the school summer holidays. This is likely to have a positive effect on their responses, lowering their scores and indicating better mental health. By contrast many farmers, while having a break from their farm routine for a day or two, will still be "at work" given that they are at an agricultural show. It could also be argued that the higher GHQ-12 scores for farmers and their spouses reflect a time in the agricultural year when pressure may be heightened due to lambing, silage making and the imminent cereal harvest.

The sample of farmers and non-farmers may also not be representative of their respective population groups. This is largely due to the constraints of the survey implementation and resources available. For example, the stands neighbouring the university stand have remained relatively constant for the three years of the survey and most have an environmental and conservation theme. This may suggest that the survey sample is drawn from a section of the general population (and farmers) with an interest in these areas. Such an interest may predispose respondents towards particular scoring patterns.

Finally there is the issue of the GHQ-12 scores themselves and their meaning. While a statistically significant difference has been demonstrated for each year of the survey between farmers/spouses and non-farming respondents, the mean GHQ-12

scores are still relatively low. Answering every question "no more than usual" or "the same as usual" will generate a GHQ-12 score of 12, which corresponds to the highest mean score for farmers/spouses (see Table 2.5, year 1). Perhaps a better indicator is to examine the distribution of the higher scores, as in Table 2.13 where respondents scoring 18 or higher were highlighted. This shows the number of farmers/spouses scoring 18 or higher to have progressively declined to the point where it was zero in year 3. Even this analysis is less that totally satisfactory since the selection of the threshold score is somewhat arbitrary. The establishment of a true threshold score beyond which a respondent would be regarded as a psychiatric "case", would require an independent psychiatric assessment for the given population. A case corresponds to the average patient referred to psychiatrists and the threshold score is where the probability that an individual will be thought of as a case exceeds 0.5. For low prevalence conditions the threshold score is likely to be very high.

There are few other studies with which to compare the results, and none that employ the same methodology. A relatively recent study by Thomas and colleagues (Thomas *et al.*, 2003) found that farmers reported a lower prevalence of psychiatric morbidity than the general population, but were more likely to report that life was not worth living. However, Lobley and colleagues (Lobley *et al.*, 2004) point out that the collection of data in this survey through respondents using a computer, "arguably indicates a level of motivation and educational attainment in respondents normally associated with the more successful farmers, rather than those likely to be suffering from high psychiatric morbidity."

2.5   Conclusion

Despite the limitations of the survey in terms of sampling and health questionnaire instrument, the main finding that farmers and their spouses were shown to have worse mental health than the general population over the three years of the survey is interesting. The fact that this difference was found with farmers/spouses attending agricultural shows suggests that the results could be more pronounced if the survey were to include non-attending farmers. While there is a *prima facie* case for further research, the challenge is to devise a sampling frame to include the most depressed farmers in the study.

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Chapter 3: Results from a survey into the physical and mental health of farm families in Wales

Results from a survey into the physical and mental health of farm families in Wales

3.0   Abstract

A survey was conducted during 2002 to investigate the physical and mental health of farmers and their spouses/partners. The main aim of the survey was to investigate whether the health of farming families in Wales was related to the financial status of their farm. With the assistance of the Farm Business Survey in Wales, health questionnaires were delivered to 325 farm households throughout Wales. Usable questionnaires were returned by 195 respondents, representing 125 farms (response rate of 38%). This chapter reports on the socio-demographic variables associated with the respondents.

The main health questionnaire instrument selected for the survey was the thirty-six itemed QualityMetric Short Form, known as SF-36. This was integrated within a larger health questionnaire and used to generate physical and mental health summary scores to enable comparisons to be made in respect of socio-demographic variables for the respondents. Relevant socio-demographic variables included gender, age, questionnaire language (English or Welsh), presence of children in the household, marital status, household role, alcohol consumption, and tobacco usage. Only the inverse relationship between physical health and the age of respondents was statistically significant.

Physical and mental health summary scores for respondents were also compared to those obtained for the general population of Wales in the 1998 Welsh Health Survey. The physical health scores for farming families were slightly better than those for the general population; mental health scores for the survey sample were no worse than those for the general population.

The results provide the backdrop for the analysis of farm family health and farm economics that follow in a later chapter.

3.1 Introduction

While the risks to farmers' health are many and varied, there has been relatively little research directed towards the health and wellbeing of UK farmers (Gerrard, 1998). With respect to Welsh agriculture, there are very few examples of studies examining the health of farmers, notable examples being Boulanger *et al.*, 1999a and 1999b; Deaville, 1999; Deaville *et al.*, 2003. This project named the Farm Family Health Project sought to address this issue by investigating whether the financial status of the farm is related to the physical and mental health of the farming family. More specifically, the project aimed to test the following null hypotheses:

1. The physical and mental health of farming families is not related to farm generated incomes.

2. The physical and mental health of farming families is not related to changes in farm generated incomes.

3. The physical and mental health of farmers is not related to their net worth.

4. The physical and mental health of farmers is not related to changes in their net worth.

5. Use of health services by farm families is not related to farm generated income.

However, the formal test of these hypotheses is made in Chapter 7. This chapter reports results from a survey that was conducted among farming families in Wales during 2002 as part of the project. The aim of the chapter is to examine the relationship between the socio-demographic and health variables for the survey respondents. This will provide background information to the analysis presented in subsequent chapters; Chapter 6 reports health service access and usage, illnesses, and barriers to health service access/usage, while Chapter 7 examines the financial status of farming and farm family health.

3.2 Methodology

3.2.1 Sample recruitment

Introduction

The study required health and income data to be collected from farm households in Wales. The first challenge was to determine how to obtain the contact details of farmers to enable a sample to be recruited and surveyed. Official lists of farmers, compiled from such sources as the annual June agricultural census are maintained by

the Welsh Assembly Government and the Department for Environment, Food and Rural Affairs (DEFRA), are generally not available to researchers (Errington, 1985; Emerson and MacFarlane, 1995; Burton and Wilson, 1999). Other possibilities available to recruit farmers included using a market research company database, approaching the farming unions, or using a directory such as Yellow Pages. These are options briefly examined below under appropriate headings.

Market research companies

Market research companies maintain databases of the contact details for businesses grouped using one of the standard industrial classification systems. A major advantage of using such a service is that it enables a contact list to be assembled from a single source, with the possibility of address labels being supplied to simplify survey logistics. Nevertheless, difficulties may arise since coverage of businesses in a specialist sector, such as agriculture, may not be comprehensive for a given geographical area. This is especially relevant where the industry is dominated numerically by very small firms (mainly sole traders). The service can also be costly, the fee normally being based on the number of records supplied.

Farming unions' membership lists

In common with many other organisations, the farming unions maintain membership lists to conduct their business. While these are confidential, it may be possible to arrange a survey to be conducted through the secretariat of the union. Such a postal survey is likely reach a significant number of farms in a given geographical area, particularly if more than one union is involved.

Directories

Using a directory such as the Yellow Pages can be problematic as there will be many farms in a given area that are not listed. This may mean that it is difficult to recruit a sufficiently large sample and the results may be biased.

Solution adopted

While the above possibilities were considered, it was recognised that each had a number of short-comings in respect of conducting a survey of farm households in Wales. The solution was to seek the assistance of Dr Tim Jenkins (Director, now

retired) of the Farm Business Survey in Wales. The Farm Business Survey in Wales collects financial and physical data each year from a representative sample of farms in Wales on behalf of the Welsh Assembly Government. An exploratory meeting was held at the end of 2001 to discuss the feasibility of forwarding a health questionnaire to farm households in Wales through the Farm Business Survey. After a further meeting and exchanges of correspondence, The Farm Business Survey in Wales agreed to deliver health questionnaire packs to farm households when conducting their annual farm visits during 2002. In addition, for each farm that returned a completed health questionnaire, the Farm Business Survey agreed to supply the corresponding farm physical and financial data.

3.2.2   The survey

Timing

Farm visits by the Farm Business Survey commence in January and continue until mid September each year. The health survey was conducted in 2002 commencing in February.

Farmer union support

The support of the main farming unions in Wales was sought and obtained at an early stage of the project. Both the Farmers' Union of Wales and National Farmers' Union Wales forwarded letters of support to the Farm Family Health Project.

Procedure

Health questionnaire packs (comprising a questionnaire, a covering letter from the project team and a prepaid, preaddressed envelope) were delivered to the Farm Business Survey in Wales in early February 2002. There were two versions of the pack: one written in English and one in Welsh.

Investigational Officers delivered the packs to farms, leaving one or two packs depending on whether there was a spouse/partner in the farm household. In an attempt to increase the response rate, Investigational Officers were asked to introduce the study to farmers at the time of delivery. To assist them a number of supporting documents were supplied as A4 laminated sheets. These were an aide memoir in the form of a question and answer sheet and letters of support from both the Farmers' Union of Wales and the National Farmers' Union Wales. In the event that questionnaire packs

could not be delivered for any reason, Investigational Officers were given a non-delivery form to complete, which detailed the reason for non-delivery.

Examples of the survey documentation, including the questionnaire, can be found in Appendix 2. The following sections discuss the development and structure of the questionnaire in detail.

3.2.3   The questionnaire

3.2.3.1 Design considerations

The questionnaire was designed to be as non-threatening and user-friendly as possible, taking into account the nature of the survey. The primary design considerations are listed below and a copy of the questionnaire can be found in Appendix 2.

Overall length and format

Long questionnaires can adversely affect response rates (Edwards *et al.*, 2002). Conscious of this, it was necessary to find a satisfactory compromise between having a comprehensive questionnaire while restricting the overall length. The adopted format was a 12-sided, stapled, A4 booklet which allowed a wide range of questions to be asked. This had good spacing and a reasonably sized font.

Anonymity/privacy

There was a need to have a system in place that would satisfy two apparently paradoxical requirements: supply anonymity to respondents of the health survey while ensuring that farm income data and health data could be matched. The system devised revolved around the unique numbers allocated to farms by the Farm Business Survey to identify their records. This Farm Number was inserted on the front of the health questionnaires at the time of delivery. The enclosed prepaid envelope was addressed to the Farm Family Health Project at Bangor, who later passed on the Farm Number to the Farm Business Survey in Wales in order for physical/income data relating to the farm to be supplied. Farm data supplied to the Farm Family Health Project did not include any information that would allow the identification of any individual participant in the Farm Business Survey in Wales. The advantages of this system were:

(iv)   Investigational Officers from the Farm Business Survey did not have access to any health data;

(v) the Farm Family Health Project could not identify any individual participating in either the Farm Business Survey or the health survey;

(vi) farm physical/income data could be matched to the health data of farmers (and their spouses/partners where appropriate).

Ease of completion

Most responses used tick boxes to reduce the amount of writing necessary and aid faster completion. While the questionnaire comprised of 12 sides of A4, it was designed to allow completion in a maximum of 25 to 30 minutes.

Choice of health questionnaire instrument

For this section of the project the thirty-six itemed version of the Short Form Health Survey, known as SF-36, was used to gather information on mental and physical health states. The SF-36 is a clinically validated, multi-purpose, short-form health survey instrument with thirty-six questions (QualityMetric Inc, 2005). It has been widely used in health research with over 240 peer-reviewed articles to date covering the SF-36 and the shorter versions of the Short Form (QualityMetric Inc, 2005b). In addition to its widespread use and acceptability, the SF-36 offered the advantages of being both a generic measure (not condition specific) of health-related quality of life and one that could be self administered. The questions require respondents to circle their chosen response in each line.

Development of health questionnaire measures, such as the SF-36, has led to the need for population 'norms' to be established. Norms are benchmark scores for the general population that have been established through a survey, which is usually sufficiently large-scale to allow analysis by sub-sample using various demographic variables. More specifically, "norm-based comparisons require valid norms for a well-defined and representative sample of the population of interest" (Ware *et al.*, 2000). This enables scores for individual respondents, or the average score for a group, to be compared to those obtained from the general population. Unfortunately, such validation studies are expensive to conduct and this limits the number of instruments for which normative data exists. Thus one clear advantage of using the SF-36 is that normative data exist.

The SF-36 exists in a number of different versions; the version used in this study was supplied under licence by QualityMetric Incorporated. This company is based in

the United States and was founded by its Chief Executive Officer and Chief Scientific Officer, Dr. J.E. Ware Jr., who was the principal developer of the SF-36 (QualityMetric Inc, 2005a). Nevertheless, QualityMetric Incorporated currently has four versions of the SF-36: Versions 1 and 2 in both standard and acute forms. Version 2 differs from Version 1 in having an expanded set of responses for some questions, while the standard form of each uses a respondent recall period of four weeks and the acute form one week.

The availability of different versions of the SF-36 has been further expanded through its adaptation for use in different countries. A UK version was developed by Brazier *et al.* (1992); the main differences are the Anglicisation of some of the language and the alteration of a social functioning item in terms of position and coding (Bowling, 1997). However, comparison of a table contained in Ware *et al.* (2000, pp3:13-3:17) outlining different SF-36 versions with the UK version of the SF-36 in Jenkinson *et al.* (1996, pp45-48), shows that the UK version was based on an earlier Developmental Version. The analysis and interpretation manual for the UK version (Jenkinson *et al.*, 1996) is also currently out of print with the website for the publication directing interested parties to the QualityMetric website (HSRU, 2005). This presented a dilemma in selecting the exact version to use in the study. Was it better to use the UK version, which was essentially a developmental version, or the more widely used US version? Intuitively, the UK version appealed, but given that many studies, including the Welsh Health Survey, have used an Anglicised version of the US instrument, this study did the same and used Version 1 with the standard recall period of four weeks.

Language

A further complication with conducting a study in Wales was the need to have a version available in the Welsh language. Since the survey was conducted throughout Wales it was important to include Welsh language versions of the questionnaire and other survey documentation. While most of the documentation could be translated without any particular difficulty, the SF-36 health questionnaire instrument posed a problem. Despite the original United States version of the SF-36 having been translated into more than fifty languages (QualityMetric, 2005), there is no official, validated Welsh version. For the purposes of this survey, the SF-36 questions were translated together with the main body of the questionnaire.

Colour of paper

The questionnaire was produced in a deep parchment colour to enable easy identification, especially when placed with other papers. The return envelopes were white (thought to be slightly better than the manila alternative) and A4 sized to enable the questionnaire to be returned unfolded.

3.2.3.2 Information sought

The questionnaire was divided into four main sections designated with the letters A to D. Sections C and D are examined in this chapter; sections A and B are examined in detail in Chapter 6.

Section A

This section was primarily used to collect information concerning respondents' use of health services. It also asked questions regarding access to health services, including possible barriers to access.

Section B

Questions in this section asked respondents about illnesses for which they had received treatment from a doctor. It also covered accidents on and off the farm.

Section C

This section comprised primarily of the SF-36 questions which examine a range of physical and mental health domains. Responses were given using scales that vary from two to six in the number of possible responses. Three further questions in this section were unrelated to the SF-36 and covered smoking, alcohol consumption, and general health. The general health question invited respondents to assess their present health using a visual analogue scale calibrated from zero to one hundred.

Section D

The final section of the questionnaire sought some background information about the respondent (gender, age, marital status, number of children) and asked about their role in the household. A question was also included to allow females to indicate whether they were currently pregnant and a final question asked respondents whether they possessed life assurance, personal accident insurance, or private health insurance.

3.3   Results

3.3.1   Sample size

Health questionnaire packs were delivered to 325 (54.8%) of the 593 farms that were in the Farm Business Survey in Wales for 2002 (Table 3.1). The main reason for non-delivery of health questionnaire packs, affecting over a quarter of all farms, was that either no farm visit was made or the farmer refused to accept a pack. For a significant number of farms Investigational Officers visited accountancy firms to make the necessary inspection of financial records: in such cases there was no opportunity to leave a health questionnaire pack. In addition, a number of farms complete the survey by telephone or forward their records by computer disk, a practice that increased during the foot and mouth crisis of 2001 and has since been maintained. The second most frequent reason for non-delivery arose from the questionnaire pack not being available to farms visited during January 2002.

Table 3.1. Deliveries of questionnaire packs to farms by the Farm Business Survey in Wales, with a breakdown of non-deliveries by reason. n, number of respondents.

	n	%
Total deliveries	325	54.8
Non-deliveries by reason:		
Farm not visited / farmer refusal	183	30.9
Pack not available	55	9.3
Medical reason	9	1.5
Other	21	3.5
Total non-deliveries	268	45.2
Total number of farms in the Farm Business Survey 2001/2002	593	100.0

A total of 574 questionnaire packs were delivered to 325 farms generating usable responses from 195 respondents, representing 125 farms (Table 3.2). This gave response rates of 34% and 38.4% for individuals and farms respectively (Table 3.2). Unfortunately, a small number of returned questionnaires were unusable, mainly because either it was not possible to identify the farm (no farm number inserted on the questionnaire), or the questionnaire was incomplete (Table 3.2). In the latter case most of the questionnaires removed had multiple missing responses to the SF-36 questions that made it impossible to calculate the physical and mental health summary scores.

Table 3.2. Main survey response by number of respondents and number of farms. n, number of respondents.

	Questionnaires		Farms represented	
	n	%	n	%
Deliveries	574	100.0	325	100.0
Returns	211	36.8	133	40.9
Less questionnaires unusable due to:				
Unable to identify	6		3	
Duplicate Record	2		1	
Incomplete	8		4	
Total unusable questionnaires	16	2.8	8	2.5
Total usable questionnaires	195	34.0	125	38.4
Less farms with no farmer response	-	-	13	4.0
Questionnaires available for analysis	195	34.0	112	34.4

Table 3.3. Breakdown of survey response by couples and single respondents. n, number of respondents.

	n	%
All respondents		
Respondents part of a couple where both responded	140	71.8
Respondents part of a couple where only one response	44	22.6
Respondents that were single	11	5.6
Total number of respondents	195	100.0
Respondents classed as farmers		
Respondents part of a couple where both responded	70	62.5
Respondents part of a couple where only one response	31	27.7
Respondents that were single	11	9.8
Total number of farmers	112	100.0
Number of respondents classed as spouses/partners		
Respondents part of a couple where both responded	70	84.3
Respondents part of a couple where only one response	13	15.7
Total number of spouses/partners	83	100.0

Where couples were surveyed, three possible response scenarios arose: both parties responded; one party responded; neither party responded (Table 3.3). Where both parties in a couple responded, it was important that the main farmer was identified to ensure consistency in data analysis. This was achieved by referring to responses to a question regarding household roles, where respondents were asked to indicate which one of five possible descriptions best described their situation (Table 3.4). The principal farmer in a couple was ascertained by selecting the respondent with the answer closest to the top of the list of possible responses. Where both indicated the

same response to the question, the male respondent was assumed to be the main farmer. It was also necessary to examine responses from respondents that were part of a couple, but where only one party had responded. Thirteen such cases were identified where the respondent was either not employed on the farm (n = 9) or they worked on the farm (n = 4), but could not be classed as the principal farmer with any degree of certainty (Table 3.3). These were removed from analysis using farm data, but retained for analysis involving farmers' spouses. This reduced the number of farms included in the main analysis to 112.

Table 3.4. Respondents by household role. n, number of respondents.

Household role	n	%
I spend all my time on the farm	117	60.0
I spend most of my time on the farm and also have an off-farm job	15	7.7
I split my time equally between the farm and an off-farm job	10	5.1
I look after the household and have an off-farm job	12	6.2
I look after the household and help occasionally on the farm	37	19.0
Non-response	4	2.1
Totals	195	100.0

3.3.2   Socio-demographic frequencies

Gender of respondents

Over half of all respondents (56.9%) were male, with only one female farmer among the total of 112 (Table 3.9).

Age of respondents

The mean age of farmers in the survey sample was 51.16 years, which compares to an average of 55 years among farmers in the whole of Wales (NAfW, 2001) (Table 3.5). The average of farmers' spouses in the survey was lower at 46.22 years, a difference of almost five years that was statistically significant ($p<0.01$). This was confirmed by the frequency distribution of respondents by age shown in Table 3.9. The highest proportion of farmers was in the 55 to 64 age group, while the highest proportion of farmers' spouses was in the 35 to 44 age group.

Table 3.5. Mean and median ages of respondents, classified by principal farmers and farmers' spouses.

	All respondents	Principal farmers	Farmers' spouses
Mean	49.08	51.16	46.22
Median	48	52	44
Standard error of the mean	0.733	0.950	1.080
Standard deviation of mean	10.159	10.008	9.716

Questionnaire language

Overall 22.1% of respondents completed the Welsh language version of the questionnaire (Table 3.9). A slightly higher proportion of farmers completed the Welsh version (24.1%) compared to farmers' spouses (19.3%) (Table 3.9). This level of response in Welsh reflects official estimates (21%) of the proportion of Welsh speakers among the population of Wales (National Statistics 2003).

Marital status

The great majority (92.3%) of respondents indicated that they were married (Table 3.9). Among farmers in the survey 87.5% were married with only 8% indicating that they were single. The number of divorcees was very low suggesting a relatively high degree of stability among the farming families in the survey. Similar findings were reported by Boulanger *et al.* (1999a) in a survey of farmers at the Royal Welsh Agricultural Show in 1998.

Household role

A single question, with five possible responses, asked respondents to indicate how they divided their time between the farm, any off-farm jobs held, and the household (Tables 3.4 and 3.6). Responses were graduated from "I spend all of my time on the farm" to "I look after the household and help occasionally on the farm". Sixty percent of all respondents indicated that they spent all of their time on the farm, while 19% had off-farm jobs (Table 3.4). The proportion of farmers' spouses reporting an off-farm job (27.7%) was just over twice that of farmers (12.5%) (Table 3.6). Nearly half of farmers' spouses (44.6 %) reported looking after the household and occasionally helping on the farm (Table 3.6).

Table 3.6. Frequency distribution of household role, classified by principal farmers and farmers' spouses. n, number of households; percentages may not sum to 100 due to rounding.

Household role	Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	n	%	n	%
I spend all my time on the farm	97	86.6	20	24.1
I spend most of my time on the farm and also have an off-farm job	10	8.9	5	6.0
I split my time equally between the farm and an off-farm job	4	3.6	6	7.2
I look after the household and have an off-farm job	0	0	12	14.5
I look after the household and help occasionally on the farm	0	0	37	44.6
Non-response	1	0.9	3	3.6
Totals	112	100.0	83	100.0

Children

Respondents were asked to indicate the number of children under sixteen years old that lived at their address using four categories based on age/education (under one year old, over 1 year but pre-schooling, at nursery/primary school, at secondary school). Almost half (48.8%) of the 125 households in the survey had no children under sixteen (Table 3.7) in them. Thirty-one households, representing nearly one quarter (24.8%) of the total, had two children and a further sixteen (12.8%) had three. Households with larger numbers of children were relatively uncommon with seven (5.6%) reporting four or five children (Table 3.7).

Table 3.7. Frequency distribution of total number of children for households in the survey. n, number of households.

Number of children in household	n	%
0	61	48.8
1	10	8.0
2	31	24.8
3	16	12.8
4	5	4.0
5	2	1.6
Totals	125	100.0

Further examination of the data revealed that ninety-one individuals (46.7%) lived in households with no children under 16 years old. This included 58 principal farmers and 33 farmers' spouses. For the 64 households that contained children, only

five (7.9%) had at least one child aged under one year old (Table 3.8). By contrast, 43 households (67.1%) had at least one child of nursery/primary school age while 37 households (57.8%) had at least one child of secondary school age (Table 3.8).

Table 3.8. Number of children by age/schooling for households in the survey where there was at least one child. n, number of households; percentages may not sum to 100 due to rounding.

	n	%
Children under 1 year		
0	59	92.2
1	4	6.3
2	1	1.6
Children over 1 year but pre-schooling		
0	54	84.4
1	10	15.6
Children at nursery/primary school		
0	21	32.8
1	15	23.4
2	23	35.9
3	3	4.7
4	2	3.1
Children at secondary school		
0	27	42.2
1	21	32.8
2	13	20.3
3	3	4.7

Alcohol consumption

Respondents were asked to indicate how many units of alcohol they consumed during a typical seven day week. Consumption was grouped into seven categories of response, ranging from none to 51 or more units. A small table, showing the quantity of various types of drink that constituted a unit of alcohol, was included as part of the question to assist respondents. Over a quarter (28.7%) of all respondents indicated that they did not consume any alcohol in a typical week, while over half (52.8%) consumed no more than seven units (Table 3.9). A higher proportion of farmers' spouses (41.0%) consumed no alcohol compared to farmers (19.6%) and a slightly lower proportion consumed up to seven units a week (Table 3.9). Interestingly, the proportion consuming between eight and fourteen units was constant between respondent categories at just under 10%.

Tobacco usage

A single question asked respondents to indicate whether they currently smoked (two possible responses), had smoked in the past but given up (two possible responses), or never smoked at all (one possible response). The frequency distributions of the five possible responses for different categories of respondent are shown in Table 3.9. The majority of all respondents (69.2%) indicated that they had never smoked, while a further 22.1% had given up smoking. Active smokers accounted for just 8.3% of all respondents. A higher proportion of farmers' spouses (77.1%) had never smoked compared to farmers (63.4%). While there were no daily smokers among farmers' spouses, 3.6% of farmers admitted to smoking daily.

Table 3.9. Frequency distributions of gender, age, questionnaire version completed, marital status, alcohol consumption, and tobacco usage, classified by principal farmers and farmers' spouses. n, number of households; percentages may not sum to 100 due to rounding.

	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	n	%	n	%	n	%
Gender of respondents						
Male	111	56.9	111	99.1	0	0
Female	84	43.1	1	0.9	83	100.0
Age of respondents						
18 – 24	0	0	0	0	0	0
25 – 34	9	4.6	1	0.9	8	9.6
35 – 44	71	36.4	37	33.0	34	41.0
45 – 54	44	22.6	24	21.4	20	24.1
55 – 64	55	28.2	39	34.8	16	19.3
65+	13	6.7	10	9.0	3	3.6
Missing	3	1.5	1	0.9	2	2.4
Questionnaire version						
English	152	77.9	85	75.9	67	80.7
Welsh	43	22.1	27	24.1	16	19.3
Marital status						
Single	9	4.6	9	8.0	0	0
Separated	0	0	0	0	0	0
Married	180	92.3	98	87.5	82	98.8
Divorced	1	0.5	1	0.9	0	0
Co-habiting	4	2.1	3	2.7	1	1.2
Widowed	1	0.5	1	0.9	0	0
Alcohol consumption (units per week)						
None	56	28.7	22	19.6	34	41.0
1 to 7	103	52.8	63	56.3	40	48.2
8 to 14	19	9.7	11	9.8	8	9.6
15 to 21	12	6.2	11	9.8	1	1.2
22 to 35	2	1.0	2	1.8	0	0
36 to 50	3	1.5	3	2.7	0	0
51 or more	0	0	0	0	0	0
Tobacco usage						
I have never smoked	135	69.2	71	63.4	64	77.1
I smoke daily	4	2.1	4	3.6	0	0
I smoke occasionally, but not every day	12	6.2	7	6.3	5	6.0
I used to smoke daily, but do not smoke at all now	22	11.3	18	16.1	4	4.8
I used to smoke occasionally, but do not smoke at all now	21	10.8	12	10.7	9	10.8
Missing	1	0.5	0	0	1	1.2

3.3.3   Scoring the SF-36

Method

Table 4.11 summarises the main stages regarding the input and processing of SF-36 data arising from the project. The raw data from the survey questionnaire was first entered into a Microsoft Access database, where the on-screen input forms were designed to minimise input error by using mouse clicks wherever possible. After all the data had been entered it was transferred to a Microsoft Excel spreadsheet where it was recoded as appropriate using the SF-36 survey manuals purchased from Medical Outcomes Trust (MOT, 1993) and QualityMetric Inc (Ware *et al.*, 2000; Ware and Kosinski, 2001). Missing data were treated in accordance with the SF-36 scoring manual recommendations (MOT, 1993). Thirty-five of the items were used to construct eight scales that relate to different dimensions of health with a single additional question examining perceptions of changes in health over the previous 12 months (Table 3.10). The eight scales were converted to the Transformation Scale so that the scores for each scale ranged from zero to one hundred.

Table 3.10. Allocation of the 36 items of the SF-36 to health dimensions.

	Number of Items
The Eight SF-36 Scales	
Physical Functioning	10
Role-Physical (role limitations due to physical problems)	4
Bodily Pain	2
General Health	5
Vitality	4
Social Functioning	2
Role-Emotional (role limitations due to emotional problems)	3
Mental Health	5
Additional Item	
Changes in health over previous 12 months	1
Total	36

At this stage a number of scoring checks were performed, as recommended by the developers of the SF-36 (Ware *et al.*, 2000). Firstly, a number of scale scores were calculated by hand to check the spreadsheet calculations. Once these had been completed the correlation between each (non-transformed) scale score and its component items were checked. Ware *et al.* (2000) suggest that the correlations should be, "...positive in direction and substantial in magnitude (0.30 or higher)."

Table 3.11. The different stages of SF-36 data input and processing followed in the study.

Stage	Description	Ref	Pages
Stage 1	**Data entry**		
a	The raw data from the questionnaires were entered into a Microsoft Access database.		
Stage 2	**Coding of data and preliminary calculations**		
a	The data were transferred to a Microsoft Excel spreadsheet.		
b	Items were recoded as appropriate.	A[1]	7-14
c	Missing items were imputed.	A[2]	18-19
d	The eight SF-36 scale scores were calculated.	A[1]	7-14
e	The eight SF-36 scale scores were converted to the Transformation Scale (0 to 100).	A[3]	19-20
f	The data held in the Excel spreadsheet (including the calculated scales) were transferred to Statistics Package for the Social Sciences (SPSS).		
Stage 3	**Scoring checks on eight SF-36 scales**		
a	A small number of SF-36 scale scores were calculated by hand to check the accuracy of the algorithms used.	A[4]	21
b	The correlations between the eight scale scores and their components were computed and checked.	A[4]	21
c	The correlations between the General Health scale and other seven scales were computed and checked.	A[4]	21
Stage 4	**Calculation of SF-36 physical (PCS) and mental (MCS) health summary scales**		
a	The eight SF-36 scales were standardised using 1998 general US population data.	B	28-31
b	Standardised scales generated in (a) above were aggregated using weights (factor score coefficients) from 1990 US general population data.	B	28-31
c	The aggregate PCS and MCS scores were standardised to give a mean of 50 and a standard deviation of 10.	B	28-31
Stage 5	**SF-36 physical (PCS) and mental (MCS) summary scoring checks**		
a	The correlations between the eight SF-36 scales and the PCS and MCS Scores were checked.	B	34
b	The correlation between the PCS and MCS scores was checked.	B	34

Table notes
Ref: Reference.
A: Medical Outcomes Trust, 1993.
B: Ware and Kosinski, 2001.
C: Ware *et al.*, 2000.
Pages: Refer to relevant page numbers in above references.
1:    Also in Reference C, pages 6:5 – 6:12.
2:    Also in Reference C, pages 6:16 – 6:17.
3:    Also in Reference C, pages 6:17 – 6:18.
4:    Also in Reference C, page 6:19.

Using Spearman's rho correlation coefficients, all correlations between the eight scale scores and their respective component items, with the exception of a single component in the Physical Functioning scale, exceeded 0.30. Moreover, all the correlations were statistically significant at the 1% level (two-tailed).

A further check suggested by Ware *et al.* (2000) is a comparison of the correlations between the General Health scale and the other seven scales, "...to verify that all correlations are positive; with rare exceptions they should also be substantial in magnitude (0.30 or higher)." Using the non-transformed scores, the Spearman's rho correlation coefficients ranged from 0.357 to 0.535 for the seven scales and each was statistically significant at the 1% level (two-tailed). Once the scoring checks had been completed, the eight transformed scales were used to generate standardised physical and mental health summary measures which have scores from zero to one hundred, with a population mean of fifty and a standard deviation of ten (Ware *et al.*, 2000). The scales were calculated in Excel with a proportion being subsequently calculated by hand to check accuracy.

The three stage process to obtain the physical and mental health summary scores is outlined in the SF-36 manual (Ware and Kosinski, 2001: pp. 28-31). Firstly, the eight transformed scales calculated from the survey data were standardised using means and standard deviations from the 1998 general United States population. The second stage involved aggregating the scores using weights (factor score coefficients) from the 1990 general United States population. The final stage standardised the physical and mental health summary scores using a linear T-score transformation to have a mean of 50 and a standard deviation of ten in the 1998 general US population. The summary scores are respectively known as the Physical (PCS) and Mental (MCS) Component Summary scales, their name coming from the principal components analysis from which they were derived (Ware and Kosinski, 2001).

Ware and Kosinski (2001; p34) recommend additional SF-36 scoring checks for the physical (PCS) and mental (MCS) health summary scores. In accordance with their recommendations the correlations between the PCS and MCS scales and the eight SF-36 scales were examined; correlation coefficients using Spearman's rho are shown for these in Table 3.12. The coefficient scores were also ranked from one to eight for each summary score for ease of reference, where a rank of one indicates the highest correlation and eight indicates the lowest.

For the survey sample, the three highest correlations for the PCS scores are with the Physical Functioning, Role-Physical, and Bodily Pain scales, while the lowest are with the Mental Health, Role-Emotional, and Social Functioning scales (Table 3.12). These results correspond to the pattern of correlations set out in Ware and Kosinski (2001; p34).

Table 3.12. Spearman's rho correlation coefficients for SF-36 Physical (PCS) and Mental (MCS) Component Summary scores with the eight SF-36 scales, for survey respondents (n = 195).

	PCS		MCS	
	Correlation Coefficient	Rank [a]	Correlation Coefficient	Rank [a]
The Eight SF-36 Scales				
Physical Functioning	0.840**	1	0.064	8
Role-Physical	0.662**	3	0.236**	7
Bodily Pain	0.790**	2	0.247**	6
General Health	0.636**	4	0.375**	5
Vitality	0.429**	5	0.661**	2
Social Functioning	0.402**	6	0.629**	4
Role-Emotional	0.185**	7	0.646**	3
Mental Health	0.086	8	0.891**	1
PCS	1.000	-	-0.010	-
MCS	-0.010	-	1.000	-

Table notes
PCS: Physical Component Summary. This is the SF-36 summary measure that indicates the physical health of respondents.
MCS: Mental Component Summary. This is the SF-36 summary measure that indicates the mental health of respondents.
**   Statistically significant at the 0.01 level (2-tailed).
a: Rank: the highest correlation coefficient is ranked 1, the lowest 8.

For the MCS scores the three lowest correlations are with the Physical Functioning, Role-Physical, and Bodily Pain scales which also corresponds to Ware and Kosinski (2001; p34) (Table 3.12). The highest correlations with the MCS scores should, according to Ware and Kosinski (2001; p34), be with the Mental Health, Role-Emotional, and Social Functioning scales. For the study sample, the Vitality scale had the second highest correlation (r = 0.661) with the MCS scores, pushing Social Functioning into fourth position. Nevertheless, given that the highest correlation coefficients for the MCS scores were all relatively similar, this is not a cause for concern. Ware and Kosinski (2001; p34) also indicate that the General Health and Vitality scales should correlate moderately with both the PCS and MCS scores (Table 3.12). While the correlation between the MCS scores and Vitality may be

slightly higher than expected, the requirement is generally fulfilled (Table 3.12). The correlation coefficient between PCS and MCS was very low at -0.010 (Table 3.12), which satisfied the final requirement of Ware and Kosinski (2001; p34) that the correlation between the PCS and MCS summary scores, "...should be very low, generally lower than 0.30."

Population weights for SF-36 physical and mental health summary scores
While the SF-36 has been translated into many languages, studies often use PCS and MCS scores that have been computed using population data from the United States. This is because conducting a survey of sufficient size to obtain the weightings for a given population will inevitably be time consuming and costly. Nevertheless, a large scale population survey conducted in the UK enabled factor score coefficients (weights) to be obtained for the UK population (Jenkinson *et al.*, 1996). However, these were obtained using the Developmental Version of the SF-36, so a further dilemma arose regarding the study. Would it be better to use US population weightings that had been obtained using the same version of the questionnaire, or should UK weightings based on a slightly different version of the questionnaire be used? Alternatively, could it be the case that it does not actually make any significant difference? Unfortunately, the literature surrounding the SF-36 is not particularly helpful in clarifying the position, although Jenkinson (1999) suggests that similar results can be obtained using either. Given that the Welsh Health Survey conducted in 1998 used the US weightings, it was decided that the US weightings would be adopted for the current study.

3.3.4 Analysis of SF-36 scores

3.3.4.1 Analysis of SF-36 scores using socio-demographic variables

This section aims to explore in detail the mean SF-36 summary scores for physical (PCS) and mental (MCS) health for the survey respondents. Table 3.13 shows mean and median SF-36 physical and mental summary scores by respondent classification along with the Kolmogorov-Smirnov significance test values. The Kolmogorov-Smirnov significance scores indicate that the distribution of SF-36 scores is non-normal for each category of respondent. Histograms illustrate this phenomenon for each group (Figures 3.1, 3.2, 3.3, and 3.4). A non-normal distribution suggests that non-parametric tests should be applied to the analysis of the results. Consequently, the Mann-Whitney U test and Kruskal-Wallis test have been used as appropriate.

Table 3.13. Test for normality of SF-36 physical (PCS) and mental (MCS) health summary scores. Other summary data shown for information only. K-S, Kolmogorov-Smirnov test for normality of distribution.

Variable/test undertaken	All respondents		Principal farmers		Farmers' spouses	
	PCS	MCS	PCS	MCS	PCS	MCS
Minimum	21.53	21.65	24.99	21.65	21.53	21.73
Maximum	67.01	67.11	67.01	65.30	62.60	67.11
Mean	51.52	50.16	51.25	50.60	51.88	49.56
Median	53.92	52.50	53.69	52.92	54.79	52.06
Standard error of the mean	0.630	0.667	0.804	0.888	1.012	1.011
Standard deviation of the mean	8.803	9.311	8.513	9.400	9.221	9.211
K-S significance	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	0.004
Normal distribution	No	No	No	No	No	No

Comparisons of SF-36 physical (PCS) and mental (MCS) health summary scores for selected socio-demographic variables are presented under a series of appropriate headings that follow.

Overall

The mean PCS and MCS scores for the entire survey sample were slightly above the expected standardised mean score of 50.00 for the SF-36 at 51.52 and 50.16 respectively (Table 3.13). The differences in mean PCS and MCS scores for principal farmers and farmers' spouses were not statistically significant in either case (PCS: Mann-Whitney U Test = 0.281, p>0.05; MCS: Mann-Whitney U Test = 0.251, p>0.05).

Figure 3.1. Frequency distribution of SF-36 physical health summary scores (PCS) for all survey respondents (n = 195).
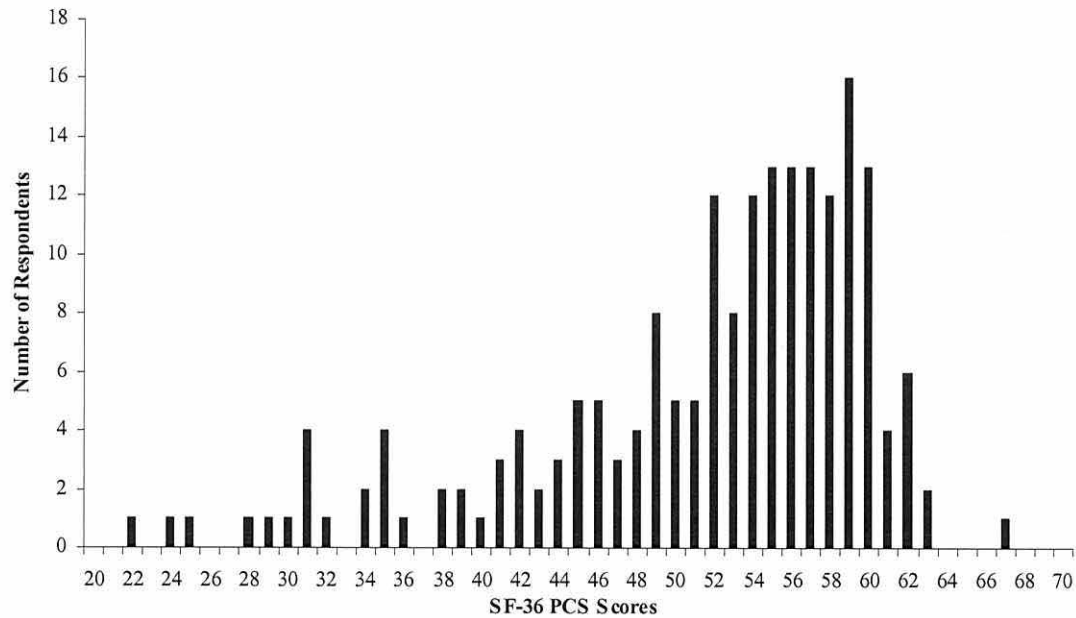
Figure 3.2. Frequency distribution of SF-36 physical health summary scores (PCS) for principal farmers (n = 112) and Farmers' spouses (n = 83).
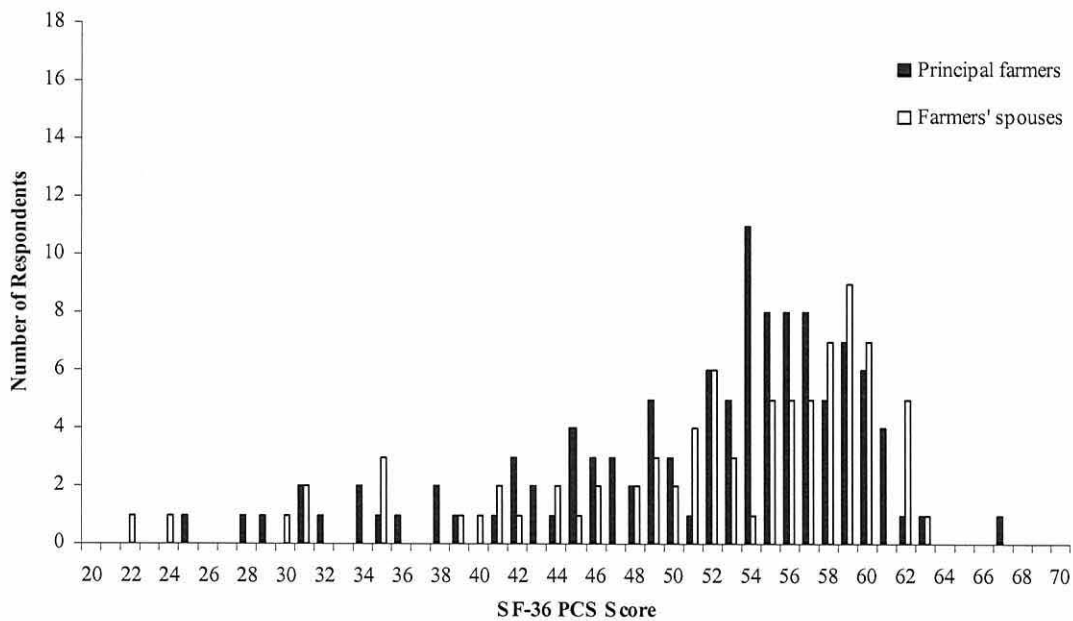
Figure 3.3. Frequency distribution of SF-36 health summary scores (MCS) for all survey respondents (n = 195).
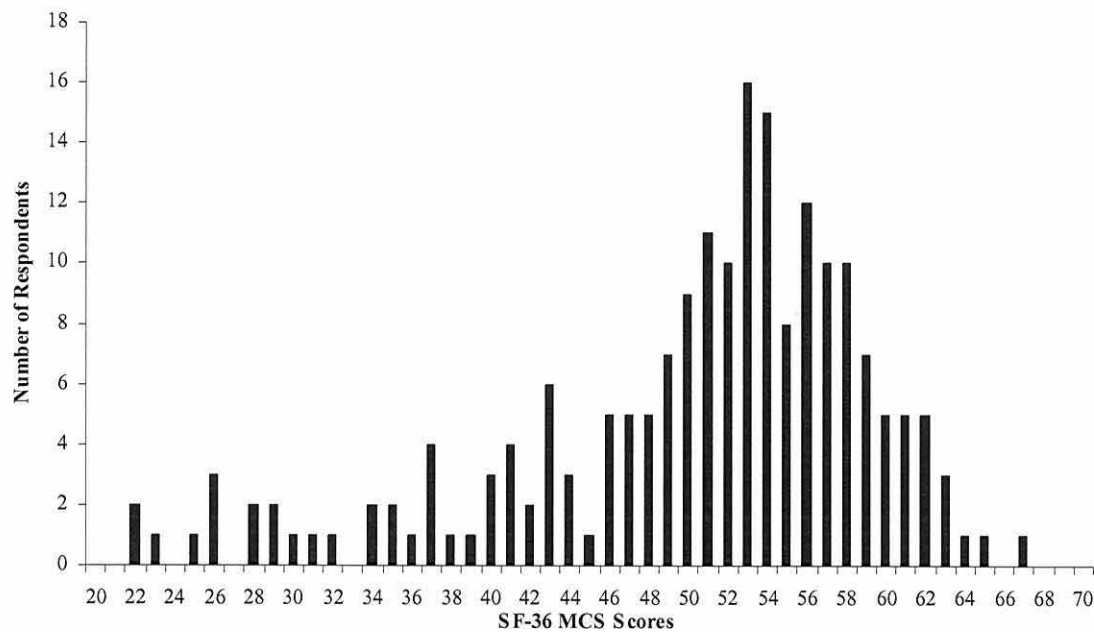
Figure 3.4. Frequency distribution of SF-36 health summary scores (MCS) for principal farmers (n = 112) and farmers' spouses (n = 83).
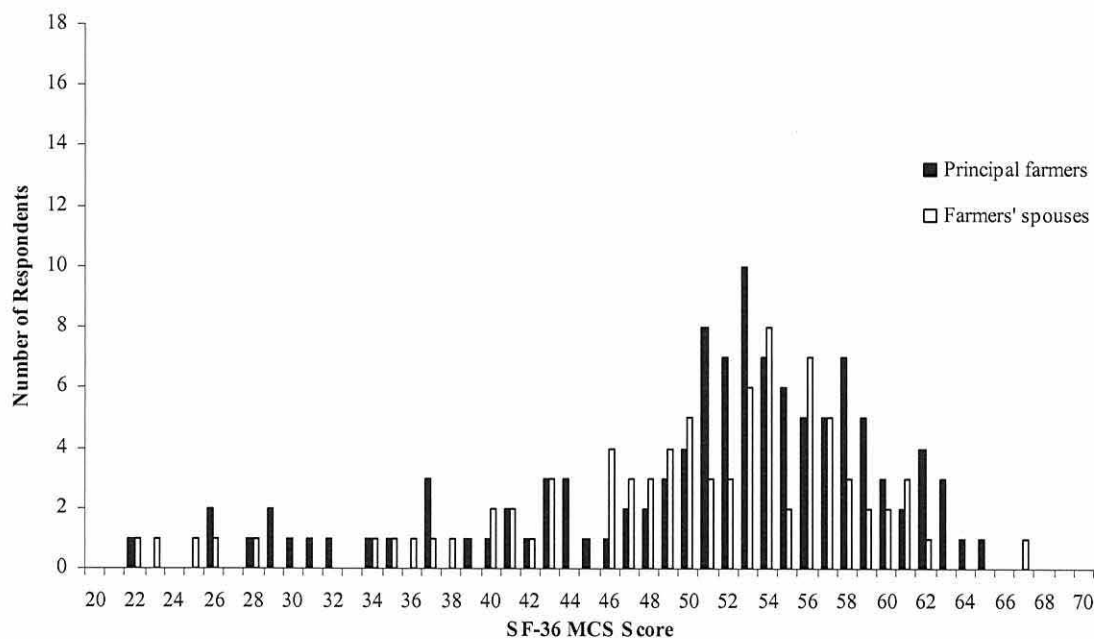
Gender

The mean PCS and MCS scores by gender are very similar to those presented above by respondent classification since all farmers' spouses are female and only one principal farmer is not male (Tables 3.9, 3.16, and 3.17). Differences in mean SF-36 PCS and MCS scores by gender are not statistically significant (Tables 3.18 and 3.20).

Age

Mean SF-36 physical health (PCS) summary scores decline for both principal farmers and farmers' spouses as age increases (Table 3.16). The mean PCS scores for principal farmers fall from 55.54 for ages 25 to 34 (although this age category had only one respondent) to 47.28 for those over 65 (Table 3.16). For farmers' spouses the range was greater: the lowest age group, 25 to 34, had a mean score of 55.79 while those over 65 years old had a mean score of 42.85 (Table 3.16). Table 3.18 shows that the difference in mean PCS scores for principal farmers was statistically significant, while that for farmers' spouses was not statistically significant.

For both principal farmers and farmers' spouses there was a statistically significant negative correlation between the age of the respondent and their SF-36 physical health score (Table 3.14). Lower PCS scores indicate poorer physical health, so the results suggest that physical health declines with increased age which is as expected.

There appears to be no clear relationship between age and mental health status for either principal farmers or farmers' spouses, although those aged 55 to 64 had the lowest MCS scores in both cases (Table 3.17). Table 3.20 confirms that differences were not statistically significant for either principal farmers or farmers' spouses. Correlations between mental health scores and age were negative and extremely small for both principal farmers (-0.040) and farmers' spouses (-0.061) with neither being statistically significant (Table 3.14).

Interestingly, for the principal farmers there was a slight negative correlation between physical and mental health scores, compared to a small positive one for farmers' spouses (Table 3.14). Neither correlation was statistically significant (Table 3.14).

Table 3.14. Spearman's rho correlation coefficients for respondents' SF-36 physical (PCS) and mental (MCS) health summary scores with their age. ** statistically significant at the 0.01 level (2-tailed); * statistically significant at the 0.05 level (2-tailed).

Variables	Age	PCS	MCS
All respondents			
Age	1.000		
PCS	-0.343 **	1.000	
MCS	-0.030	-0.010	1.000
Principal farmers			
Age	1.000		
PCS	-0.372 **	1.000	
MCS	-0.040	-0.140	1.000
Farmers' spouses			
Age	1.000		
PCS	-0.275 *	1.000	
MCS	-0.061	0.173	1.000

Questionnaire language

The physical health scores were higher for principal farmers returning a Welsh questionnaire as opposed to farmers' spouses where those returning English questionnaires recorded the higher scores (Table 3.16). With regard to mental health scores, both principal farmers and farmers' spouses returning English questionnaires had higher scores (Table 3.17). Tables 3.18 and 3.20 indicate that with regard to the version of questionnaire completed, there were no statistically significant differences in physical or mental health scores for either principal farmers or farmers' spouses.

Marital status

While respondents that were single had the highest mean SF-36 physical health summary score (55.65), this group recorded the lowest mean (47.43) mental health summary score (Tables 3.16 and 3.17). Nevertheless, this class of respondents only accounted for 4.6% of respondents, as opposed to over 92% who reported being married (Table 3.9). The small number of respondents in some groups means that differences in mean physical and mental health scores should be interpreted with caution. Neither physical nor mental health score differences between groups were statistically significant (Tables 3.18 and 3.20).

Household role

The mean SF-36 physical health summary scores for principal farmers with different household roles were very similar, only varying by 0.36 between the highest and lowest (Table 3.15). For farmers' spouses there was a much wider range of scores and the difference in scores between groups was statistically significant (Tables 3.15 and 3.18). The group with the highest mean score (57.83) among farmers' spouses were those indicating that they split their time equally between the farm and an off-farm job, while those with the lowest mean score (47.85) indicated that they looked after the household and helped occasionally on the farm (Table 3.15). It is possible that the poorer physical health status of this latter group precluded them from taking a more active role on the farm or having an off-farm job.

Table 3.15. Mean SF-36 physical (PCS) and mental (MCS) health summary scores for principal farmers and farmers' spouses, presented by household role. n, number of respondents; s.e., standard error of the mean.

Role	All respondents (n = 195)		Principal farmers (n =112)		Farmers' spouses (n = 83)		All respondents (n = 195)		Principal farmers (n =112)		Farmers' spouses (n = 83)	
	PCS	s.e.	PCS	s.e.	PCS	s.e.	MCS	s.e.	MCS	s.e.	MCS	s.e.
1	51.81	0.76	51.10	0.86	55.25	1.29	49.88	0.85	50.75	0.91	45.69	2.07
2	52.88	1.95	51.04	2.68	56.54	1.66	48.10	3.17	49.34	3.33	45.61	7.28
3	55.26	2.13	51.40	4.41	57.83	1.58	54.45	1.55	57.48	2.75	52.44	1.46
4	53.44	2.24	-	-	53.44	2.24	53.17	2.31	-	-	53.17	2.31
5	47.85	1.80	-	-	47.85	1.80	50.56	1.46	-	-	50.56	1.46

Table key
Household roles:
1: I spend most of my time on the farm.
2: I spend most of my time on the farm and also have an off-farm job.
3: I split my time equally between the farm and an off-farm job.
4: I look after the household and have an off-farm job.
5: I look after the household and help occasionally on the farm.

Among principal farmers those with the highest mean SF-36 mental health summary score (57.48) split their time equally between the farm and an off-farm job (Table 3.17). However, the number of respondents in this category was small (n = 4) and the difference in scores between groups was not statistically significant (Tables 3.9 and 3.20). For farmers' spouses the lowest mean mental health scores were recorded by those spending all or most of their time on the farm, while the highest score was once again for the group that split their time equally between the farm and an off-farm job (Table 3.17). The number of respondents was again small (n = 6); the difference in scores between groups was not statistically significant (Tables 3.9 and 3.20).

Table 3.16. Mean SF-36 physical (PCS) health summary scores for principal farmers and farmers' spouses, presented by selected socio-demographic variables. n, number of respondents; s.e., standard error of the mean

	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	PCS	s.e.	PCS	s.e.	PCS	s.e.
All respondents						
Overall	51.52	0.63	51.25	0.80	51.88	1.01
Gender of respondents						
Male	51.35	0.80	51.35	0.80	-	-
Female	51.73	1.01	39.46	-	51.88	1.01
Age of respondents						
18 – 24	-	-	-	-	-	-
25 – 34	55.76	1.27	55.54	-	55.79	1.44
35 – 44	54.32	0.81	54.75	1.06	53.85	1.25
45 – 54	50.06	1.55	50.32	1.64	49.76	2.83
55 – 64	49.11	1.23	49.00	1.51	49.39	2.14
65+	46.26	2.30	47.28	2.50	42.85	6.05
Questionnaire version						
English	51.32	0.73	50.60	0.96	52.24	1.11
Welsh	52.19	1.25	53.28	1.35	50.36	2.45
Marital status						
Single	55.65	1.42	55.65	1.42	-	-
Separated	-	-	-	-	-	-
Married	51.49	0.66	50.94	0.89	52.15	0.99
Divorced	39.46	-	39.46	-	-	-
Co-habiting	45.73	6.25	51.09	4.55	29.65	-
Widowed	53.85	-	53.85	-	-	-
Children						
No children in household	49.00	0.99	48.90	1.17	49.18	1.81
Children present in household	53.71	0.75	53.77	1.00	53.66	1.13
Alcohol consumption (units per week)						
None	50.54	1.20	51.20	1.79	50.12	1.61
1 to 7	51.96	0.87	51.68	1.08	52.41	1.47
8 to 14	51.78	2.26	47.78	3.18	55.92	2.65
15 to 21	52.36	2.30	51.82	2.45	58.27	-
22 to 35	53.72	3.45	53.72	3.45	-	-
36 to 50	47.77	4.26	47.77	4.26	-	-
51 or more	-	-	-	-	-	-
Tobacco usage						
I have never smoked	52.27	0.76	51.94	1.03	56.64	1.13
I smoke daily	54.54	2.53	54.54	2.53	-	-
I smoke occasionally, but not every day	50.53	2.38	51.10	3.69	49.74	2.92
I used to smoke daily, but do not smoke at all now	49.33	1.88	48.17	2.09	54.56	3.65
I used to smoke occasionally, but do not smoke at all now	48.78	2.05	50.74	2.05	46.17	3.92

Table 3.17. Mean SF-36 mental (MCS) health summary scores for principal farmers and farmers' spouses, presented by selected socio-demographic variables. n, number of respondents; s.e., standard error of the mean

	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	MCS	s.e.	MCS	s.e.	MCS	s.e.
All respondents						
Overall	50.16	0.67	50.60	0.89	49.56	1.01
Gender of respondents						
Male	50.60	0.90	50.60	0.90	-	-
Female	49.58	1.00	51.10	-	49.56	1.01
Age of respondents						
18 – 24	-	-	-	-	-	-
25 – 34	51.30	2.37	56.97	-	50.59	2.56
35 – 44	51.24	1.02	52.20	1.19	50.21	1.69
45 – 54	50.29	1.29	50.22	1.97	50.38	1.63
55 – 64	49.28	1.27	49.74	1.50	48.14	2.46
65+	50.77	3.17	51.26	3.98	49.14	4.75
Questionnaire version						
English	50.72	0.74	51.05	1.01	50.31	1.09
Welsh	48.16	1.48	49.19	1.85	46.43	2.48
Marital status						
Single	47.43	4.04	47.43	4.04	-	-
Separated	-	-	-	-	-	-
Married	50.30	0.69	50.91	0.92	49.56	1.02
Divorced	51.10	-	51.10	-	-	-
Co-habiting	48.60	5.86	48.38	8.28	49.25	-
Widowed	55.42	-	55.42	-	-	-
Children						
No children in household	49.71	1.00	49.36	1.35	50.31	1.43
Children present in household	50.56	0.90	51.94	1.12	49.06	1.40
Alcohol consumption (units per week)						
None	48.75	1.44	51.03	2.16	47.27	1.89
1 to 7	50.76	0.78	50.46	1.02	51.23	1.21
8 to 14	49.10	2.36	48.92	3.91	49.33	1.98
15 to 21	50.25	3.53	49.14	3.68	62.47	-
22 to 35	61.10	2.72	61.10	2.72	-	-
36 to 50	55.10	3.31	55.10	3.31	-	-
51 or more	-	-	-	-	-	-
Tobacco usage						
I have never smoked	49.46	0.84	49.68	1.24	49.21	1.11
I smoke daily	52.34	2.35	52.34	2.35	-	-
I smoke occasionally, but not every day	53.71	1.02	54.57	1.09	52.51	1.94
I used to smoke daily, but do not smoke at all now	50.40	1.57	50.61	1.81	49.44	3.32
I used to smoke occasionally, but do not smoke at all now	51.76	2.45	53.15	2.46	49.91	4.81

Table 3.18. Statistical tests on mean SF-36 physical (PCS) health summary scores of selected socio-demographic variables for principal farmers and farmers' spouses.

Variable/test undertaken	All respondents		Principal farmers		Farmers' spouses	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
Gender of respondents						
M-W Test (Asymp Sig 2-tailed)	0.377	No	0.232	No	n/a	n/a
Age of respondents						
K-W Test (Asymp Sig)	p<0.001	Yes**	0.008	Yes**	0.126	No
Questionnaire language						
M-W Test (Asymp Sig 2-tailed)	0.573	No	0.162	No	0.525	No
Marital status						
K-W Test (Asymp Sig)	0.337	No	0.364	No	0.104	No
Household role						
K-W Test (Asymp Sig)	0.122	No	0.960	No	0.013	Yes*
Children						
M-W Test (Asymp Sig 2-tailed)	p<0.001	Yes**	0.001	Yes**	0.068	No
Alcohol consumption						
K-W Test (Asymp Sig)	0.728	No	0.872	No	0.149	No
Tobacco usage						
K-W Test (Asymp Sig)	0.137	No	0.368	No	0.190	No

Table notes
M-W Test: Mann-Whitney U Test.
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between SF-36 scores for groups within the variable concerned. 'No' indicates p>0.05.
**   Significant at the 0.01 level.
*   Significant at the 0.05 level.
n/a: Not applicable. Only one group for respondent classification of demographic variable considered.

Children

Higher mean SF-36 physical health summary scores were recorded for both principal farmers and farmers' spouses that had children in the household compared with those that did not have any children in the household (Table 3.16). The difference in scores was statistically significant for principal farmers (p = 0.001), but was not statistically significant for farmers' spouses (Table 3.18). The likely explanation is that having children at home will be related to age and that physical health has been shown to be negatively correlated to age (Table 3.14). The mean ages for those individuals in households with and without children are shown in Table 3.19 by respondent classification. As expected, the individuals in households with no children have a higher mean age than those in household with children and the differences are statistically significant (Table 3.19).

Table 3.19. Mean ages for those in households with and without children under 16 present with Mann-Whitney U Test results for differences between mean ages for these groups. n, number of respondents; M-W Test: Mann-Whitney U Test; ** significant at the 0.01 level.

	All Respondents (n = 192)	Principal Farmers (n = 111)	Farmers' Spouses (n = 81)
Mean age for those with no children at home	57.48	58.29	56.06
Mean age for those with children at home	41.50	43.36	39.46
M-W Test (Asymp Sig 2-tailed)	p<0.001	p<0.001	p<0.001
Statistically significant	Yes **	Yes **	Yes **

Principal farmers living in a household with children had a higher mean SF-36 mental summary score (51.94) compared to those that lived in households without children (49.36) (Table 3.17). For farmers' spouses the positions were reversed; the difference in scores was also smaller (Table 3.17). Differences were not statistically significant for either principal farmers or farmers' spouses (Table 3.20).

Alcohol consumption

While mean SF-36 physical health summary scores for range from 47.77 to 53.72 for the different alcohol consumption groups of principal farmers, there appears to be no clear relationship between physical health and consumption of alcohol for principal farmers (Table 3.16). For farmers' spouses mean SF-36 physical health scores are higher for groups consuming a greater amount of alcohol (Table 3.16). Nevertheless, only one respondent is recorded as consuming over fourteen units per week with a further eight recording consumption as being between eight and fourteen units a week (Table 3.9). Differences in SF-36 physical health scores for different alcohol consumption groups were not statistically significant for either principal farmers or farmers' spouses (Table 3.18).

The mean SF-36 mental health summary scores for principal farmers show no clear relationship to alcohol consumption (Table 3.17). The lowest score (48.92) for any group was for those consuming between eight to fourteen units per week, while the highest score (61.10) was for those consuming between twenty-two and thirty-five units (Table 3.17). However, there were only two respondents in the latter group and differences in the mental health scores between groups were not statistically significant (Table 3.20). For farmers' spouses there was again no clear pattern between mental

health scores and alcohol consumption (Table 3.17). Differences between groups were not statistically significant (Table 3.20).

Table 3.20. Statistical tests on mean SF-36 mental (MCS) health summary scores of selected socio-demographic variables, for principal farmers and farmers' spouses.

Variable/test undertaken	All respondents		Principal farmers		Farmers' spouses	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
Gender of respondents						
M-W Test (Asymp Sig 2-tailed)	0.235	No	0.750	No	n/a	n/a
Age of respondents						
K-W Test (Asymp Sig)	0.822	No	0.625	No	0.973	No
Questionnaire language						
M-W Test (Asymp Sig 2-tailed)	0.119	No	0.284	No	0.196	No
Marital status						
K-W Test (Asymp Sig)	0.936	No	0.888	No	0.676	No
Household role						
K-W Test (Asymp Sig)	0.543	No	0.293	No	0.114	No
Children						
M-W Test (Asymp Sig 2-tailed)	0.714	No	0.266	No	0.533	No
Alcohol consumption						
K-W Test (Asymp Sig)	0.328	No	0.351	No	0.196	No
Tobacco usage						
K-W Test (Asymp Sig)	0.490	No	0.652	No	0.833	No

Table notes
M-W Test: Mann-Whitney U Test.
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between SF-36 scores for groups within the variable concerned. 'No' indicates $p>0.05$.
**   Significant at the 0.01 level.
*   Significant at the 0.05 level.
n/a: Not applicable. Only one group for respondent classification of demographic variable considered.

Tobacco usage

Principal farmers that were in either of the two groups that had previously smoked reported the lowest mean SF-35 physical health summary scores (48.17 and 50.74) and this may reflect the effects of an underlying medical condition that prompted them to stop smoking (Table 3.16). The highest score (54.54) was reported by the small (n = 4) group of daily smokers (Tables 3.9 and 3.16). Nevertheless, differences between groups were not statistically significant (Table 3.18). For farmers' spouses the highest mean SF-36 physical health summary score (56.64) was recorded for the majority group (n = 64) who reported that they had never smoked (Tables 3.9 and 3.16). Differences in SF-36 physical health scores for different tobacco usage groups were not statistically significant for either principal farmers or farmers' spouses (Table 3.18).

Among principal farmers the group representing those that were occasional smokers reported the highest mean SF-36 mental health summary score (54.57), while the majority group (n = 71) that had never smoked recorded the lowest mean mental health score (49.68) (Table 3.17). This was also the case for farmers' spouses where the highest score (52.51) was for the small group of occasional smokers (n = 5) and the lowest (49.21) for the majority group (n = 64) who had never smoked (Tables 3.9 and 3.17). Differences in SF-36 mental health scores for different tobacco usage groups were not statistically significant for either principal farmers or farmers' spouses (Table 3.20).

3.3.4.2 Comparison of SF-36 scores in the study with those in the Welsh Health Survey (1998) and the United States 1998 general population norms.

One advantage of using the SF-36 health questionnaire instrument in a study is that normative data exist with which comparisons can be made. The Welsh Health Survey (NAfW, 1999), with over thirty thousand respondents, used the SF-36 in 1998 and normative data exists for the US general population derived from a survey conducted in 1998 (Ware and Kosinski, 2001). Table 3.21 shows mean SF-36 physical (PCS) and mental (MCS) health summary scores for respondents to the Farm Family Health Project along with the aforementioned surveys, presented by gender. The highest mean PCS scores for males and females were for the farming families responding to the Farm Family Health Project in Wales. The mean PCS scores were 2.7 and 4.1 higher for males and females respectively compared to those recorded in the Welsh Health Survey, with the US population PCS norms being intermediate for both males and females. The higher PCS scores for the farm family members that responded to the Farm Family Health Project survey, implies their physical health was better than that recorded for the general Welsh population.

With regard to the mean SF-36 MCS scores, the most noticeable feature was the high level of consistency between the different surveys. This was particularly true for males where there was only a 0.1 variation between scores.

Table 3.21. Mean SF-36 physical (PCS) and mental (MCS) summary scores for respondents to the Farm Family Health Project (2002) and the Welsh Health Survey (1998) with United States 1998 general population norms, by gender.

	PCS			MCS		
	FFHP	WHS	US	FFHP	WHS	US
Male	51.4	48.7	50.9	50.6	50.6	50.5
Female	51.7	47.6	49.2	49.6	48.4	49.5

Table notes
US and FFHP data has been rounded to 1 decimal point to be consistent with Welsh Survey figures.
PCS: Physical Component Summary. This is the SF-36 summary measure that indicates the physical health of respondents.
MCS: Mental Component Summary. This is the SF-36 summary measure that indicates the mental health of respondents.
FFHP: Farm Family Health Project (i.e. current study).
WHS: Welsh Health Survey, conducted in 1998. Source: NAfW, 1999 (p.41).
US: United States 1998 general population norms. Source: Ware and Kosinski, 2001 (pp. 98-101).

Table 3.22 presents SF-36 physical (PCS) and mental (MCS) health summary scores by gender and age for the three studies. The figures for some categories should be interpreted with caution since the number of respondents in the Farm Family Health Project was relatively small, just a single respondent for two age groups (Table 3.22).

Generally, Farm Family Health Project respondents had higher mean PCS scores for each age group for both males and females, compared to results from the Welsh Health Survey (Table 3.22). Mean MCS scores were better for younger males and females in the survey sample compared to the Welsh Health Survey and generally slightly lower for older age groups (Table 3.22).

Table 3.22. Mean SF-36 physical (PCS) and mental (MCS) summary scores for respondents to the Farm Family Health Project (2002) and the Welsh Health Survey (1998) with United States 1998 general population norms, by gender and age group.

Age of respondents	n	PCS			MCS		
		FFHP [c]	WHS	US [c]	FFHP [c]	WHS	US [c]
Males							
18 – 24	0	-	54.8	See below	-	50.7	See below
25 – 34	1	55.5	53.2	54.4	57.0	50.2	49.3
35 – 44	37	54.7	51.6	52.0	52.2	49.9	50.8
45 – 54	24	50.3	48.3	50.9	50.2	50.2	49.9
55 – 64	38	49.2	42.2	48.1	49.7	50.8	52.5
65 – 74	9	47.5	39.9	43.5	54.1	52.8	51.5
75+	1	45.4	36.2	See below	26.1	51.7	See below
Total	110						
Females							
18 – 24	0	-	54.3	See below	-	46.8	See below
25 – 34	8	55.8	53.0	53.1	50.6	47.3	46.7
35 – 44	34	53.9	51.4	51.7	50.2	47.6	48.4
45 – 54	20	49.8	46.9	47.9	50.4	48.3	50.7
55 – 64	17	48.8	43.3	47.5	48.3	50.9	51.8
65 – 74	3	42.9	38.8	42.2	49.1	51.3	53.0
75+	0	-	32.8	See below	-	49.0	See below
Total	82						

Table notes
US and FFHP data has been rounded to 1 decimal point to be consistent with Welsh Survey figures.
n: Number of respondents in Farm Family Health Project.
-:   Empty cell..
a: Age category for US data is 18-34.
b: Age category for US data is 65+.
c: US and FFHP data has been rounded to 1 decimal point.
PCS: Physical Component Summary. This is the SF-36 summary measure that indicates the physical health of respondents.
MCS: Mental Component Summary. This is the SF-36 summary measure that indicates the mental health of respondents.
FFHP: Farm Family Health Project (i.e. current study).
WHS: Welsh Health Survey, conducted in 1998. Source: NAfW, 1999 (p.41).
US: United States 1998 general population norms. Source: Ware and Kosinski, 2001 (pp. 98-101).

3.4. Discussion

3.4.1 Response rate

3.4.1.1 Advantages of Farm Business Survey assistance

Enlisting the assistance of the Farm Business Survey presented a number of benefits to the health survey in terms of geographical coverage, survey logistics, response, as well as data quality and quantity. These are examined below under their respective headings.

Representativeness

The Farm Business Survey included farms throughout Wales offering the prospect of comprehensive geographical coverage. Moreover, the Farm Business Survey is designed to be representative of the different types of farms that exist in Wales (UWA, 2003).

Survey logistics

Farm Business Survey involvement avoided the need to recruit and survey farm households directly from Bangor. Such a survey would have been time consuming and costly, particularly if conducted using personal interviews where a considerable amount of travelling would have been necessary to cover the whole of Wales. In addition, appointments with farmers can be difficult to arrange and there is the risk of them being broken or cancelled.

Response

The delivery of questionnaires by Investigational Officers whom the farmers knew presented an opportunity to boost response rates beyond that of a conventional postal survey.

Data quality and quantity

The assistance of the Farm Business Survey overcame the most important concerns regarding data collection. These primarily revolved around the need to ensure sufficient detail to ensure consistency, while keeping the questionnaire length reasonable so as not to adversely affect the response rate. This was particularly pertinent with respect to farm income data, the accuracy and reliability of which would be difficult to ascertain, especially with a postal survey. With other approaches it could

be difficult to determine whether the financial figures obtained in the survey reflected the farm gross margin, farm income, cash income, drawings or an arbitrary figure selected by the farmer. Using the Farm Business Survey ensured that farm physical and financial data was consistent in terms of definition and calculation, having been collected to an established and proven methodology. This meant that the Farm Family Health Project survey questionnaire could focus exclusively on health matters, enabling more health data to be collected.

3.4.1.2 Disadvantages of Farm Business Survey assistance

Despite the advantages of Farm Business Survey assistance highlighted above, there were a small number of drawbacks.

Restrictions imposed

The Farm Family Health Project had to agree to a small number of preconditions before the Farm Business Survey would undertake delivery of the questionnaire packs on its behalf. These were primarily to protect established relationships with farmers on which the Farm Business Survey relies to carry out its work. The first was the right not to deliver a questionnaire pack where there was a known difficulty in the household such as depression, an acute medical condition, or suspected alcoholism. This effectively removed from the survey those farmers and their spouses/partners that would have been most likely to report poor mental and/or physical health and introduced a source of potential response bias.

Another precondition was that the Farm Family Health Project would be unable to follow-up farmers in the event of non-response. Dillman (1978) suggests adopting a system of follow-up to non-respondents to improve response rates in postal surveys. This involves sending a postcard reminder to non-respondents a fortnight after sending the original questionnaire and then a further full questionnaire to those from whom a response has not been elicited after one month. For this survey access to farm households was indirect through the Farm Business Survey in Wales. The need for the Farm Business Survey to maintain a good on-going relationship with their farmer co-operators meant that they were unwilling for any kind of follow up approach to be made to non-respondents. It is likely that the response rate could have been increased slightly if this possibility had been available.

Timing

A number of issues arose due to the timing of the survey. The questionnaire packs were delivered to the Farm Business Survey in early February, by which time annual visits had already commenced, resulting in the loss of fifty-five farms to the health survey. Nevertheless, it is difficult to see how the health survey could have been implemented earlier.

The survey was conducted continuously until the end of September 2002, corresponding to the end of the Farm Business Survey annual farm visits. This means that farmers and their spouses/partners completed questionnaires throughout an eight month period. Whilst it was recognised that it was desirable to keep the survey period to a minimum to reduce the possible effects of season or external events, there was little that could be done practically in this case. Nevertheless, the eight month period compares favourably with the time which would have been required to complete such a survey using an interview team based in Bangor.

However, a further effect of the survey timing may have been to reduce the response rate. While the Farm Business Survey tries to maximise the number of farm visits during periods of the year when the level of activity on farms is reduced, it is inevitable that a number of visits will occur at the peak times of lambing, silage making and harvest. It is likely that questionnaires delivered during these periods would have a reduced probability of being completed.

Other factors

Having the survey administered by the Farm Business Survey also precluded to a large extent the opportunity for farmers to have any questions answered first hand concerning the Farm Family Health Project. This was mitigated as far as possible through briefing the Investigational Officers of the Farm Business Survey and supplying each of them with an *aide memoir* for use on farms. In addition, the pack contained a covering letter introducing the project and contact details of the Farm Family Health Project in Bangor.

3.4.1.3 Other factors affecting the survey response rate

The burden of paperwork experienced by farmers

Farming is recognised as a stressful occupation and paperwork/bureaucracy has been highlighted as a major stressor to farmers (McGregor, 1995; Boulanger, 1999a). Even if the project was of interest to the farmer and/or spouse the questionnaire may not have been completed due to the pressures of other 'paperwork'. There is evidence among the non-delivery notes from FBS Investigational Officers that the perceived overburdening paperwork was a reason cited for non-acceptance of a questionnaire pack by a number of farmers.

The Length of the questionnaire

A survey questionnaire is likely to be a compromise between being sufficiently long to obtain the necessary data at the required level of detail against the need to keep the length reasonable. Research has shown (Edwards *et al.*, 2002) that the length of questionnaire will influence the response rate achieved in a survey. This is likely to be related to the above point concerning the burden of paperwork experienced among farmers. Completion of a twelve page questionnaire may have appeared a daunting undertaking to the farmers and spouses being surveyed.

3.4.2   Health status of respondents and demographics

3.4.2.1   Physical health

This chapter has examined in considerable detail the relationship between socio-demographic variables of survey respondents and their health, as measured by the SF-36. The range of SF-36 physical (PCS) health summary scores was wide, varying across all respondents from 21.53 to 67.01 (Table 3.13). Nevertheless, the median score of 53.92 and mean of 51.52 suggests that the physical health of survey respondents overall was slightly better than would be expected for the general population (Table 3.13). This is confirmed when comparing the mean scores in the present study to those obtained in the Welsh Health Survey in 1998 (Table 3.22). Across all age groups the SF-36 physical (PCS) health summary scores are consistently higher for respondents in the Farm Family Health Project. Nevertheless, caution should be exercised in attempting to extrapolate this result to the general farming population in Wales due to the relatively small sample and the restrictions imposed on the survey outlined in the previous section.

With respect to physical health and demographic variables, the only statistically significant results revolved around age (Table 3.18). The inverse relationship between physical health and age in the survey is hardly surprising and is formally evidenced by the declining SF-36 PCS scores for higher age groups in both the 1998 Welsh Health Survey and the US 1998 general population norms (Table 3.22). The finding regarding respondents in households with children having better physical health is a further reflection of the age/health relationship.

The relatively good physical health of respondents may be due to healthy lifestyles. Less than nine percent of respondents were active smokers with only two percent smoking daily (Table 3.9). Similarly, alcohol consumption was for the most part within the Department of Health guidelines (DoH, 2005) of a recommended maximum of two to three units of alcohol per day for women and three to four for men (Table 3.9).

3.4.2.2 Mental health

As with physical health, the range of SF-36 mental (MCS) health summary scores was wide with a low of 21.65 and a high of 67.11 (Table 3.13). However, the median (52.50) and mean (50.16) scores suggest that the mental health of respondents was no worse overall than would be expected in the general population. This is confirmed by comparing the mean SF-36 MCS scores for different age groups with those obtained in the Welsh Health Survey in 1998 (Table 3.22). For most age categories Farm Family Health Project respondents had higher mean MCS scores, the exceptions being for the older age groups where differences were very small.

The relatively favourable mental health profile for respondents to the survey may be due to sample filtering by the Farm Business Survey in Wales combined with a twelve page questionnaire which may have deterred completion by those feeling anxious or depressed. Nevertheless, there were some interesting results related to marital status and having an off-farm job. Single farmers had lower mean SF-36 mental health scores than those who were married and farmers dividing their time equally between farming and an off-farm job had higher mean scores (Table 3.17). Having a marriage partner and/or an off-farm job may reduce any potential feelings of isolation and improve mental wellbeing. Mental health may also be improved through having a source of income that is derived away from the farm. Such an income source, as well as providing additional financial resources, may be more secure and certain

than farm generated income. However, numbers were small and in common with the other socio-demographic variables, differences in SF-36 mental (MCS) health summary scores were not statistically significant (Table 3.20).

3.5 Conclusion

An examination of the physical and mental health of farmers and farmers' spouses in Wales with respect to socio-demographic variables has not yielded any surprises. This is reassuring as it eliminates socio-demographic variables, other than the effect of age on physical health, as major factors in the remaining analysis.

Chapter 4:   Results from using a Visual Analogue Scale in a survey looking at the health of farm families and the financial status of farms in Wales

Results from using a Visual Analogue Scale in a survey looking at the health of farm families and the financial status of farms in Wales

4.0   Abstract

This chapter continues the analysis of data collected in the survey that was outlined in Chapter 3. The survey questionnaire included a visual analogue scale (VAS) asking respondents to rate their current health on a scale of zero to one hundred. This chapter examines the relationship between VAS score and the socio-demographic variables associated with the respondents. Relevant socio-demographic variables included gender, age, questionnaire language (English or Welsh), presence of children in the household, marital status, household role, alcohol consumption, and tobacco usage. The results confirm the findings obtained using SF-36 in the same survey: only the inverse relationship between physical health and the age of respondents was statistically significant.

4.1 Introduction

While a wide range of health instrument questionnaires have been developed in recent years to examine different dimensions of health, the visual analogue scale (VAS) can trace its origins back to the 1920s (Wewers and Lowe, 1990). Crichton (2001) describes a visual analogue scale (VAS) as, "a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot be easily directly measured." While a VAS can take a variety of forms, it usually comprises either a horizontal or vertical line with appropriate word descriptors at each end. For example, a VAS used to assess pain experienced by patients could be marked at each end "no pain" and "very severe pain" respectively; patients would indicate their current level of pain by marking an appropriate place on the line. The simplicity of visual analogue scales and their ease of administration have ensured that they are widely used in the measurement of individuals' health states (Parkin and Devlin, 2003).

This chapter reports the results obtained from a VAS question that was incorporated into the health survey outlined in Chapter 3. The aim of this chapter is to examine the relationship between VAS scores and the socio-demographic variables for respondents; a comparison is made with results obtained using the SF-36 in Chapter 3. A comparison is also made with the UK general population norms (Kind *et al.*, 1999) for the EQ-5D VAS used in this study.

4.2 Methodology

A visual analogue scale (EuroQol, 2005) was obtained from the EuroQol EQ-5D health measurement instrument and incorporated into the Farm Family Health Project health survey questionnaire. The EQ-5D is a public domain questionnaire that can be used royalty free for non-commercial research (EuroQol, 2005). A single question asked respondents to rate their current health state using a visual analogue scale. The scale was vertically aligned and had equally spaced marks at intervals from zero to 100, resembling a thermometer in appearance (see Figure 2.3). Respondents were instructed to indicate their current health by drawing a line to the appropriate point on the scale, where zero represented the worst health state imaginable and 100 the best. Respondents' scores were entered into the survey results database for analysis.

4.3 Results

Overall

The SF-36 physical (PCS) and mental (MCS) health summary scores were positively and significantly correlated to the visual analogue scale scores for both principal farmers and farmers' spouses (Table 4.1).

Table 4.1. Spearman's rho correlation coefficients for respondents' SF-36 physical (PCS) and mental (MCS) health summary scores with their Visual Analogue Scale (VAS) scores. ** statistically significant at the 0.01 level (2-tailed);

Variables	VAS	PCS	MCS
All respondents			
VAS	1.000		
PCS	0.587 **	1.000	
MCS	0.367 **	-0.010	1.000
Principal farmers			
VAS	1.000		
PCS	0.575 **	1.000	
MCS	0.244 **	-0.140	1.000
Farmers' spouses			
VAS	1.000		
PCS	0.603 **	1.000	
MCS	0.531 **	0.173	1.000

Gender

The mean Visual Analogue Scale (VAS) scores for males (81.48) in the survey were slightly higher than those for females (80.96), but the difference was not statistically significant (Tables 4.3 and 4.4). The mean VAS score for all survey respondents was 81.26 (n = 195).

Age

Mean VAS scores for principal farmers generally decreased for older age groups indicating a reduction in health status with increased age (Table 4.3). The exception was for those over sixty-five years old who had a higher mean score than those in the age group immediately below them. Nevertheless, the overall pattern is as expected given the correlation between physical health and age established in Section 3.3.4.1 (Table 3.14). The results of a Kruskal-Wallis Test confirm that the differences in VAS scores for different age groups for principal farmers were statistically significant ($p<0.05$) (Table 4.4).

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Mean VAS scores were generally higher for farmers' spouses in lower age groups, though the trend was not as clearly defined as for principal farmers (Table 4.3). Differences in mean VAS scores for different age groups of farmers' spouses were not statistically significant (Table 4.4).

Questionnaire language

Overall, respondents completing an English questionnaire had a slightly lower mean VAS score than those completing the Welsh version (Table 4.3). The difference in scores was not statistically significant (Table 4.4).

Marital status

With over 92% of respondents indicating that they were married, differences in mean VAS scores in this section need to be interpreted with caution (Tables 4.3). The mean scores for those that were married were very similar for both principal farmers (81.21) and farmers' spouses (81.17) (Table 4.3). Differences in mean VAS scores between marital status groups were not statistically significant (Table 4.4).

Household role

Mean VAS scores were slightly higher for principal farmers that split their time equally between the farm and an outside job than for those that spent all or most of their time on the farm (Table 4.2). For farmers' spouses the highest mean VAS scores were also for those that split their time equally between the farm and an off-farm job (Table 4.2). The lowest mean scores for farmers' spouses were for those that spent their time looking after the household and occasionally helping on the farm (Table 4.2). However, the differences in mean VAS scores for different household role groups were not statistically significant for either principal farmers or farmers' spouses (Table 4.4).

Table 4.2. Visual Analogue Scale (VAS) scores for principal farmers and farmers' spouses, presented by household role. n, number of respondents; s.e., standard error of the mean.

Household role	All respondents		Principal farmers		Farmers' spouses	
	VAS	s.e	VAS	s.e	VAS	s.e
1	81.54	1.34	81.40	1.50	82.26	3.00
2	82.00	4.56	81.80	6.30	82.40	6.31
3	85.89	4.63	83.75	6.25	87.60	7.22
4	83.55	3.40	-	-	83.55	3.40
5	77.62	3.21	-	-	77.62	3.21

Table key
Household roles:
1:   I spend most of my time on the farm.
2:   I spend most of my time on the farm and also have an off-farm job.
3:   I split my time equally between the farm and an off-farm job.
4:   I look after the household and have an off-farm job.
5:   I look after the household and help occasionally on the farm.

Children

Mean VAS scores were higher for both principal farmers and farmers' spouses that lived in households with children (Table 4.3). Results from Mann Whitney U Tests confirm that there was a statistically significant difference in scores for principal farmers, though not for farmers' spouses (Table 4.4). The higher scores, indicating better health, for respondents in households with children may reflect the inverse correlation between age and physical health (Table 4.3).

Alcohol consumption

Generally, increased alcohol consumption appeared to be associated with higher mean VAS scores for farmers' spouses (Table 4.3). For principal farmers the lowest mean VAS scores are for those consuming between eight and fourteen units of alcohol per week, with both higher and lower consumers having higher scores (Table 4.3). Mean VAS scores for different weekly alcohol consumption levels were not significantly different for either principal farmers or farmers' spouses (Table 4.4).

Table 4.3. Mean Visual Analogue Scale (VAS) scores for principal farmers and farmers' spouses, presented by selected socio-demographic variables. n, number of respondents; s.e., standard error of the mean.

	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	VAS	s.e.	VAS	s.e.	VAS	s.e.
All respondents						
Overall	81.26	1.11	81.60	1.42	80.80	1.77
Gender of respondents						
Male	81.48	1.43	81.48	1.43	-	-
Female	80.96	1.76	95.00	-	80.80	1.77
Age of respondents						
18 – 24	-	-	-	-	-	-
25 – 34	86.78	3.70	100.00	-	85.13	3.76
35 – 44	86.69	1.36	87.51	1.51	85.79	2.32
45 – 54	78.66	2.43	80.79	2.71	76.10	4.24
55 – 64	76.13	2.42	76.46	3.00	75.31	4.12
65+	78.15	4.43	79.00	4.64	75.33	13.48
Questionnaire version						
English	80.99	1.28	80.55	1.70	81.55	1.96
Welsh	82.19	2.21	84.89	2.40	77.63	4.19
Marital status						
Single	85.33	5.23	85.33	5.23	-	-
Separated	-	-	-	-	-	-
Married	81.19	1.15	81.21	1.52	81.17	1.75
Divorced	95.00	-	95.00	-	-	-
Co-habiting	69.25	10.11	75.67	11.05	50.00	-
Widowed	90.00	-	90.00	-	-	-
Children						
No children in household	77.13	1.82	77.33	2.33	76.79	2.92
Children present in household	84.87	1.25	86.19	1.32	83.44	2.16
Alcohol consumption (units per week)						
None	79.79	2.24	82.09	3.65	78.29	2.86
1 to 7	81.80	1.51	82.33	1.88	80.95	2.56
8 to 14	81.05	3.74	75.73	5.32	88.38	4.09
15 to 21	85.17	2.81	83.91	2.75	99.00	-
22 to 35	90.00	0.00	90.00	0.00	-	-
36 to 50	70.00	5.77	70.00	5.77	-	-
51 or more	-	-	-	-	-	-
Tobacco usage						
I have never smoked	81.93	1.32	82.87	1.80	80.89	1.95
I smoke daily	87.75	4.96	87.75	4.96	-	-
I smoke occasionally, but not every day	81.58	4.50	81.86	6.77	81.20	6.12
I used to smoke daily, but do not smoke at all now	76.45	3.53	75.39	3.85	81.25	9.66
I used to smoke occasionally, but do not smoke at all now	79.86	3.54	81.17	3.16	78.11	7.36

Table 4.4. Results of statistical tests on mean Visual Analogue Scale (VAS) scores for principal farmers and farmers' spouses by selected socio-demographic variables.

Variable/test undertaken	All respondents		Principal farmers		Farmers' spouses	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
Gender of respondents						
M-W Test (Asymp Sig 2-tailed)	0.948	No	0.321	No	n/a	n/a
Age of respondents						
K-W Test (Asymp Sig)	0.002	Yes**	0.017	Yes**	0.131	No
Questionnaire language						
M-W Test (Asymp Sig 2-tailed)	0.694	No	0.186	No	0.333	No
Marital status						
K-W Test (Asymp Sig)	0.385	No	0.527	No	0.121	No
Household role						
K-W Test (Asymp Sig)	0.773	No	0.888	No	0.709	No
Children						
M-W Test (Asymp Sig 2-tailed)	0.002	Yes**	0.008	Yes**	0.062	No
Alcohol consumption						
K-W Test (Asymp Sig)	0.560	No	0.354	No	0.151	No
Tobacco usage						
K-W Test (Asymp Sig)	0.527	No	0.282	No	0.996	No

Table notes
M-W Test: Mann-Whitney U Test.
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between SF-36 scores for groups within the variable concerned. 'No' indicates $p>0.05$.
**   Significant at the 0.01 level.
n/a: Not applicable. Only one group for respondent classification of demographic variable considered.

Tobacco usage

For principal farmers the small number of daily smokers (n = 4) recorded the highest mean VAS score, while two categories of former smokers recorded the lowest (Table 4.3). The mean VAS scores for farmers' spouses showed less variation between tobacco usage categories than those for principal farmers (Table 4.3). Mean VAS scores for tobacco usage groups were not significantly different for either principal farmers or farmers' spouses (Table 4.4).

4.3.1 Comparison of VAS scores in the study with general population norms for Wales

Kind *et al.* (1999) report UK population norms for the EQ-5D VAS using socio-demographic variables: Table 4.5 shows the VAS norms for Wales, by age group. Mean VAS scores are generally lower for respondents to the Farm Family Health Project survey compared to the general population norms for Wales (Table 4.5). Kind *et al.* (1999) suggest that, "mean scores presented for cells containing around 30 cases or less [should] be interpreted with caution."

Table 4.5. Mean Visual Analogue Scale (VAS) scores for respondents to the Farm Family Health Project (FFHP) (2002) and general population norms for Wales, by age group.

Age of respondents	FFHP			Wales		
	VAS	n	s.d.	VAS	n	s.d.
Whole population						
18 – 24	-	-	-	89.83	12	17.50
25 – 34	86.78	9	11.11	86.86	29	12.63
35 – 44	86.69	71	11.41	90.00	22	18.12
45 – 54	78.66	44	16.09	86.33	12	14.55
55 – 64	76.13	55	17.94	93.73	11	18.72
65 – 74	80.50	12	14.15	70.65	20	7.54
75+	50.00	1	-	82.91	11	20.80
All respondents	81.25	192	15.51	85.21	117	12.33

Table notes
n: Number of respondents.
s.d.:   Standard deviation of the mean. The standard error of the mean was not available for Wales (UK VAS norm) data.
-:   Empty cell..
PCS: Physical Component Summary. This is the SF-36 summary measure that indicates the physical health of respondents.
MCS: Mental Component Summary. This is the SF-36 summary measure that indicates the mental health of respondents.
FFHP: Farm Family Health Project (i.e. current study).
Wales: Source: Kind *et al.*, 1999 (Table 2.1.6).

4.4 Discussion

The visual analogue scale was included in this study to give an additional indicator of self-reported health for survey respondents. The only statistically significant results obtained related to the age of respondents and the presence of children in the household (Table 4.4). These results generally mirrored those obtained using the SF-36 physical (PCS) health summary measure (Table 3.14). The mean VAS score of 81.26 for all respondents was slightly higher than that recorded (77.65) in the survey of 252 attendees at the Royal Welsh Agricultural Show in 2004 reported in Chapter 2. Nevertheless, both of these mean scores were lower than that recorded by Kind *et al.* (1999) for the general population of Wales. General population norms for the VAS indicated slightly poorer health for the respondents to the Farm Family Health Project: for the SF-36 summary measures farm families scored slightly higher than the general population norms. It is unclear as to why this should be the case, but the VAS being a single dimension health instrument may be a factor. Also, the number of observations used to compile the Welsh VAS norms was relatively small (n = 117) (Kind *et al.*, 1999).

The statistically significant positive correlations between PCS scores and the VAS scores were as expected. Higher scores indicate better health for both measures and respondents are likely to relate their current health state primarily to their physical health. Interestingly, the positive correlations between SF-36 mental (MCS) health summary scores and VAS scores were also statistically significant. Yet the correlations between PCS and MCS scores, discussed in Chapter 3, were not statistically significant (Table 4.1). This suggests that while the VAS is a highly subjective single dimension instrument, it is capable of capturing elements of both physical and mental health. While respondents are likely to base their assessment primarily on their physical health, this will be influenced and filtered by how they are feeling mentally and emotionally.

4.5 Conclusion

The only socio-demographic variables to show any statistically significant relationship to self-reported health were age and the presence of children in the household. Results from the visual analogue scale support the results obtained using the SF-36 in Chapter 3.

Chapter 5: Results from a survey into the physical and mental health of farm families in Wales: a sub-sample of farmers and their spouses

Results from a survey into the physical and mental health of farm families in Wales: a sub-sample of farmers and their spouses

5.0   Abstract

A survey was conducted during 2002 to investigate the physical and mental health of farmers and their spouses/partners. The main aim of the survey was to investigate whether the health of farming families in Wales was related to the financial status of their farm. Details of the survey and the main health questionnaire instrument used, the QualityMetric SF-36, are reported in Chapter 3. This chapter reports on the socio-demographic variables associated with the respondents for a sub-sample of farmers and their spouses. The socio-demographic variables analysed included gender, age, questionnaire language (English or Welsh), presence of children in the household, marital status, household role, alcohol consumption, and tobacco usage. Results for the sub-sample replicate those for the whole survey sample; only the inverse relationship between physical health and the age of respondents was statistically significant.

5.1   Introduction

The health survey of farming families in Wales conducted as part of the Farm Family Health project was outlined in Chapter 3. Among the 195 respondents to the health survey there were 70 couples where both members responded (Table 3.3). The health status of respondents was measured using the SF-36 questionnaire instrument, details of which are contained in Chapter 3. The results for the sub-sample (n = 140) were compared to the results obtained for the whole survey sample (n = 195).

5.2   Methodology

The health survey used to obtain the data for this analysis has been presented in Chapter 3. The farm identification numbers used by the Farm Business Survey allowed the sub-sample to be selected from the survey dataset.

5.3   Results

Gender

The mean PCS and MCS scores for the farmers and their spouses were very similar (Tables 5.5 and 5.6). The small differences in mean SF-36 PCS and MCS scores by gender were not statistically significant (Tables 5.7). These results are the same as those presented for the whole survey sample in Chapter 3.

Age

The findings with respect to the physical and mental health of principal farmers and farmers' spouses in different age groups reflected those recorded in Chapter 3. Mean SF-36 physical (PCS) health summary scores declined for principal farmers as age increased: for farmers' spouses the trend was similar, except for the 55 to 64 age group (Table 5.5). The difference in mean PCS scores for principal farmers was statistically significant, while that for farmers' spouses was not statistically significant (Table 5.7).

Table 5.1. Spearman's rho correlation coefficients for SF-36 physical (PCS) and mental (MCS) health summary scores with age for a sub-sample of farmers and their spouses. ** statistically significant at the 0.01 level (2-tailed).

Variables	Age	PCS	MCS
Principal farmers			
Age	1.000		
PCS	-0.479 **	1.000	
MCS	-0.068	-0.174	1.000
Farmers' spouses			
Age	1.000		
PCS	-0.328 **	1.000	
MCS	-0.082	0.098	1.000

For both principal farmers and farmers' spouses there is a statistically significant negative correlation between the age of the respondent and their SF-36 physical (PCS) health score (Table 5.1). These findings are the same as those reported for the whole survey sample: physical health declined with increased age.

There was no clear relationship between age and mental health status for either principal farmers or farmers' spouses; the differences in scores for different age groups were not statistically significant in either case (Tables 5.6 and 5.7). Correlations between mental health scores and age were not statistically significant for either principal farmers or farmers' spouses (Table 5.1).

Table 5.2. Frequency distributions of gender, age, questionnaire version completed, marital status, alcohol consumption, and tobacco usage, for a sub-sample of farmers and their spouses. n, number of households; percentages may not sum to 100 due to rounding.

	Principal farmers (n = 70)		Farmers' spouses (n = 70)	
	n	%	n	%
Gender of respondents				
Male	70	50.0	-	-
Female	-	-	70	50.0
Age of respondents				
18 – 24	-	-	-	-
25 – 34	1	1.4	3	4.3
35 – 44	25	35.7	30	42.9
45 – 54	14	20.0	16	22.9
55 – 64	21	30.0	16	22.9
65+	8	11.4	3	4.3
Missing	1	1.4	2	2.9
Questionnaire version				
English	55	78.6	55	78.6
Welsh	15	21.4	15	21.4
Marital status				
Single	-	-	-	-
Separated	-	-	-	-
Married	69	98.6	69	98.6
Divorced	-	-	-	-
Co-habiting	1	1.4	1	1.4
Widowed	-	-	-	-
Children				
No children present in household	30	42.9	30	42.9
Children present in household	40	57.1	40	57.1
Alcohol consumption (units per week)				
None	13	18.6	29	41.4
1 to 7	38	54.3	33	47.1
8 to 14	7	10.0	7	10.0
15 to 21	8	5.7	1	1.4
22 to 35	2	2.9	-	-
36 to 50	2	2.9	-	-
51 or more	-	-	-	-
Tobacco usage				
I have never smoked	39	55.7	53	75.7
I smoke daily	4	5.7	-	-
I smoke occasionally, but not every day	5	5.7	5	7.1
I used to smoke daily, but do not smoke at all now	13	18.6	3	4.3
I used to smoke occasionally, but do not smoke at all now	9	12.9	8	11.4
Missing	-	-	1	1.4

Questionnaire version

The physical health scores for principal farmers were highest for those returning a Welsh questionnaire, while for farmers' spouses those returning English questionnaires recorded the higher scores (Table 5.5). With regard to mental health scores, both principal farmers and farmers' spouses returning English questionnaires had higher scores than those returning Welsh ones (Table 5.6). However, despite the difference between the two versions, there were no statistically significant differences in physical or mental health scores for either principal farmers or farmers' spouses (Tables 5.7).

Marital status

Almost all the couples in the sub-sample were married (69 out of 70) with only one couple recorded as co-habiting (Table 5.2).

Household role

There was very little variation in the mean SF-36 physical (PCS) health summary scores for principal farmers by household role, while the PCS scores for farmers' spouses range from 46.89 to 57.05 (Table 5.3). While mean PCS scores were not significantly different between household roles for principal farmers they were for farmers' spouses (Table 5.7).

Mean SF-36 mental (MCS) health summary scores varied from 50.27 to 57.48 for principal farmers with those dividing their time equally between the farm and an off-farm job having the highest mean score (indicating better mental health) (Table 5.3). Mean MCS scores ranged from 45.49 to 53.42 for farmers' spouses, the lowest being for those that spent all their time on the farm and the highest being for those dividing their time equally between the farm and an off-farm job (Table 5.3). Mean MCS score were not significantly different between household roles for either principal farmers or farmers' spouses (Table 5.7).

Table 5.3. Mean SF-36 physical (PCS) and mental (MCS) health summary scores for farmers and their spouses, presented by household role. n, number of respondents; s.e., standard error of the mean.

Role	Principal farmers (n =70)						Farmers' spouses (n = 70)					
	n	%.	PCS	s.e.	MCS	s.e.	n	%	PCS	s.e.	MCS	s.e.
1	57	81.4	51.28	1.121	50.27	1.234	15	21.4	55.23	1.688	45.49	2.565
2	8	11.4	49.64	3.096	50.99	3.299	5	7.1	56.54	1.660	45.61	7.284
3	4	5.7	51.40	4.408	57.48	2.750	5	7.1	57.05	1.685	53.42	1.318
4	-	-	-	-	-	-	10	14.3	53.30	2.692	52.80	2.774
5	-	-	-	-	-	-	31	44.3	46.89	1.991	50.63	1.485

Table key
Household roles:
1: I spend most of my time on the farm.
2: I spend most of my time on the farm and also have an off-farm job.
3: I split my time equally between the farm and an off-farm job.
4: I look after the household and have an off-farm job.
5: I look after the household and help occasionally on the farm.

Children

Thirty households in the sub-sample did not have any children aged under sixteen living at home (Table 5.4). Out of the remaining 40 households almost half (19) had two children, while 7 had one child and 7 had three children. Seven families (10.0%) had four or more children (Table 5.4).

Mean SF-36 physical health summary scores were significantly higher for those in households where children were present compared to those who live in households with no children (Table 5.5 and 5.7). This may be a reflection of the negative correlation between age and physical health (Table 5.1).

With regard to mental health there is relatively little variation between those in households with children and those without. The SF-36 mental health summary scores for principal farmers are slightly higher for those where there are children in the household, while for farmers' spouses the position is reversed (Table 5.6). The differences were not statistically significant (Table 5.7).

Table 5.4. Frequency distribution of the total number of children in the household for a sub-sample of farmers and their spouses in the survey. n, number of households.

Number of children in household	n	%
0	30	42.9
1	7	10.0
2	19	27.1
3	7	10.0
4	5	7.1
5	2	2.9
Totals	70	100.0

Alcohol consumption

While mean SF-36 physical health summary scores for range from 43.80 to 53.18 for the different alcohol consumption groups of principal farmers, no clear relationships between physical health and consumption of alcohol emerged (Table 5.5). For farmers' spouses mean SF-36 physical health scores are higher for groups consuming a greater amount of alcohol (Table 5.5). Differences in SF-36 physical health scores for different alcohol consumption groups were not statistically significant for either principal farmers or farmers' spouses (Table 5.7).

The mean SF-36 mental health summary scores for principal farmers showed no clear relationship to alcohol consumption (Table 5.6). Differences in the mental health scores between groups were not statistically significant (Table 5.7). For farmers' spouses there was again no clear pattern between mental health scores and alcohol consumption (Table 5.6). Differences between groups were not statistically significant (Table 5.7).

Table 5.5. Mean SF-36 physical (PCS) health summary scores for a sub-sample of farmers and their spouses in the survey, presented by selected socio-demographic variables. n, number of respondents; s.e., standard error of the mean.

	Principal farmers (n = 70)		Farmers' spouses (n = 70)	
	PCS	s.e.	PCS	s.e.
Gender of respondents				
Male	51.33	1.02	-	-
Female	-	-	51.62	1.15
Age of respondents				
18 – 24	-	-	-	-
25 – 34	55.54	-	57.27	2.85
35 – 44	55.09	1.36	54.43	1.25
45 – 54	50.55	2.02	48.44	3.43
55 – 64	48.71	2.04	49.39	2.14
65+	45.28	2.60	42.85	6.05
Questionnaire version				
English	51.10	1.19	51.99	1.29
Welsh	52.14	2.02	50.25	2.62
Marital status				
Single	-	-	-	-
Separated	-	-	-	-
Married	51.38	1.04	51.93	1.13
Divorced	-	-	-	-
Co-habiting	47.80	-	29.65	-
Widowed	-	-	-	-
Children				
No children present in household	47.63	1.58	48.39	1.92
Children present in household	54.10	1.17	54.04	1.31
Alcohol consumption (units per week)				
None	53.18	1.80	50.03	1.77
1 to 7	51.73	1.51	51.98	1.76
8 to 14	48.26	3.38	55.49	3.02
15 to 21	50.36	3.20	58.27	-
22 to 35	53.72	3.45	-	-
36 to 50	43.80	2.64	-	-
51 or more	-	-	-	-
Tobacco usage				
I have never smoked	51.19	1.62	52.57	1.30
I smoke daily	54.54	2.53	-	-
I smoke occasionally, but not every day	54.38	2.74	49.74	2.92
I used to smoke daily, but do not smoke at all now	50.35	1.63	53.13	4.75
I used to smoke occasionally, but do not smoke at all now	50.19	2.43	45.56	4.39

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Table 5.6. Mean SF-36 mental (MCS) health summary scores for a sub-sample of farmers and their spouses in the survey, presented by selected socio-demographic variables. n, number of respondents; s.e., standard error of the mean.

	Principal farmers (n = 70)		Farmers' spouses (n = 70)	
	MCS	s.e.	MCS	s.e.
Gender of respondents				
Male	50.36	1.17	-	-
Female	-	-	49.70	1.10
Age of respondents				
18 – 24	-	-	-	-
25 – 34	56.97	-	51.67	2.55
35 – 44	52.65	1.23	50.77	1.71
45 – 54	49.04	2.65	50.42	1.90
55 – 64	49.58	2.18	48.14	2.46
65+	50.31	4.95	49.14	4.75
Questionnaire version				
English	50.56	1.30	50.73	1.18
Welsh	49.63	2.71	45.93	2.59
Marital status				
Single	-	-	-	-
Separated	-	-	-	-
Married	50.63	1.15	49.71	1.11
Divorced	-	-	-	-
Co-habiting	31.84	-	49.25	-
Widowed	-	-	-	-
Children				
No children present in household	49.30	1.98	50.17	1.53
Children present in household	51.15	1.42	49.35	1.56
Alcohol consumption (units per week)				
None	51.69	2.75	48.27	1.98
1 to 7	49.53	1.47	50.77	1.43
8 to 14	48.66	5.31	48.70	2.16
15 to 21	49.61	3.67	62.47	-
22 to 35	61.10	2.72	-	-
36 to 50	55.63	5.66	-	-
51 or more	-	-	-	-
Tobacco usage				
I have never smoked	48.71	1.77	49.44	1.19
I smoke daily	52.34	2.35	-	-
I smoke occasionally, but not every day	54.47	0.97	52.51	1.94
I used to smoke daily, but do not smoke at all now	50.13	2.25	47.09	3.31
I used to smoke occasionally, but do not smoke at all now	54.67	3.08	50.01	5.46

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Table 5.7. Results of statistical tests on mean SF-36 physical (PCS) and mental (MCS) health summary scores of selected demographic variables for a sub-sample of farmers and their spouses.

Variable/test undertaken	Principal farmers PCS		Farmers' spouses PCS	
	Statistic	Sig	Statistic	Sig
Age of respondents				
K-W Test (Asymp Sig)	0.009	Yes**	0.103	No
Questionnaire language				
M-W Test (Asymp Sig 2-tailed)	0.769	No	0.601	No
Household role				
K-W Test (Asymp Sig)	0.755	No	0.014	Yes*
Children				
M-W Test (Asymp Sig 2-tailed)	0.001	Yes**	0.020	Yes*
Alcohol consumption				
K-W Test (Asymp Sig)	0.468	No	0.271	No
Tobacco usage				
K-W Test (Asymp Sig)	0.653	No	0.241	No

Variable/test undertaken	MCS		MCS	
	Statistic	Sig	Statistic	Sig
Age of respondents				
K-W Test (Asymp Sig)	0.632	No	0.957	No
Questionnaire language				
M-W Test (Asymp Sig 2-tailed)	0.726	No	0.127	No
Household role				
K-W Test (Asymp Sig)	0.267	No	0.270	No
Children				
M-W Test (Asymp Sig 2-tailed)	0.522	No	0.652	No
Alcohol consumption				
K-W Test (Asymp Sig)	0.350	No	0.312	No
Tobacco usage				
K-W Test (Asymp Sig)	0.295	No	0.623	No

Table notes
M-W Test: Mann-Whitney U Test.
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between SF-36 scores for groups within the variable concerned. 'No' indicates p>0.05.
**   Significant at the 0.01 level.
*   Significant at the 0.05 level.
n/a: Not applicable. Only one group for respondent classification of demographic variable considered, or numbers too small in sub-group to allow valid test.

Tobacco usage

Principal farmers that were in either of the two groups that had previously smoked reported the lowest mean SF-36 physical health summary scores (50.35 and 50.19) and this may reflect the effects of an underlying medical condition that prompted them to stop smoking (Table 5.5). Differences in SF-36 physical health scores for different tobacco usage groups were not statistically significant for either principal farmers or farmers' spouses (Table 5.7).

Among principal farmers the group that had never smoked recorded the lowest mean mental health score (48.71) (Table 5.6). The case for farmers' spouses differed in that the lowest (47.09) mean score was recorded by those that had previously smoked but given up (n = 3) (Table 5.6). Differences in SF-36 mental health scores for different tobacco usage groups were not statistically significant for either principal farmers or farmers' spouses (Table 5.7).

5.4   Discussion

The sub-sample replicated the results obtained for the whole survey sample in Chapter 3. This is not surprising as the sub-sample of farmers and their spouses represented over 70% of the complete survey sample. However, for each couple in the sub-sample factors such as household income, domestic situation, and farm related variables would have been identical. Nevertheless, for this study the sub-sample did not yield any additional insights into relationship between the socio-demographic and health variables for farmers and their spouses.

5.5   Conclusion

The relationship between socio-demographic variables and health variables was not significantly different for the sub-sample of farmers and their spouses compared to the whole survey sample.

Chapter 6: Illness and health care service utilisation among farm families in Wales

Illness and health care service utilisation among farm families In Wales

6.0   Abstract

This chapter presents further results from the analysis of data collected in the survey of farm households that was outlined in Chapter 3. More specifically, it reports on illnesses and accidents suffered by respondents, health care service utilisation, barriers to health care access, and desired improvements to health care service provision.

Incidence rates for heart conditions, cancer, back pain, diabetes, and varicose veins among respondents were broadly similar to those recorded in the Welsh Health Survey in 1998 for the general population. However, survey respondents had lower rates of respiratory and mental illness. The number of farm accidents reported was relatively high and suggests that farm safety is still a cause for concern. Utilisation of primary and secondary health care services was lower among survey respondents than for equivalent socio-demographic groups (age, gender) in the general population. This suggests that there may be a latent demand for health care services among principal farmers and farmers' spouses in the survey sample.

Regression analysis confirmed that the physical health status of respondents, as measured by SF-36, was the only statistically significant variable related to the mean number of contacts with the family doctor. There was no evidence that distance from the doctor's surgery was an issue for survey respondents. Opening hours of doctors' surgeries was an issue of considerable importance to survey respondents and an area where they indicated a desire for improvement. Levels of awareness of NHS Direct were generally only moderate among survey respondents and usage was low. Only a very small proportion of survey respondents accessed medical information through the internet.

6.1 Introduction

The provision of rural health care presents difficulties arising from access and transport (BMA, 2005). There are likely to be additional costs and travel times for both patients and the medical professionals providing health care services. Moreover, difficulties in accessing health care services may lead to poor health outcomes for some rural residents. For example, a study conducted in East Anglia by Jones *et al.* (1999) found that, "inaccessibility of hospital services may increase the risk of asthma mortality." Bentham (1984) showed that mortality rates were higher in rural areas of England and Wales, while studies in Scotland showed that those living further away from the city based cancer centres had poorer prospects in terms of the diagnosis and survival of various cancers (Campbell *et al.*, 2000; 2001). While concern regarding the provision of health care services to the Scottish Highlands has a long history (Godden and Richards, 2003), Shannon *et al.* (1969) suggest that, more generally, academic interest in the distance between patient and health care provider can be traced back to 1927. A number of recent publications have sought to further highlight and address issues surrounding the provision of rural health care services (Temple, 2002; BMA, 2005; Buchan & Davies, 2005).

Access to rural health care services is an issue that is particularly relevant to farming families in Wales. The large population centres in Wales tend to be concentrated along the M4 motorway "corridor" in the south and to a lesser extent along the coast in the north. Between the two areas there are some of the least densely populated counties of the UK. This uneven population distribution provides a number of challenges to those with responsibility for providing health care services in Wales. Ensuring equity of access to health care services may be problematic in areas where transport links are poor and the population insufficient to warrant the provision of some facilities. The purpose of this chapter is to report findings from a survey of farm families in Wales conducted during 2002. The survey sought to explore:

(i)   the incidence of selected illnesses among farmers and their spouses compared to the general population;

(ii) the health care service utilisation of farmers and their spouses;

(iii) the potential barriers to farmers and their spouses seeking medical advice and treatment;

(iv) the improvements that farmers and their spouses would like to see in health care service provision.

6.2   Methodology

Health survey

A survey was conducted of farm households in Wales during 2002, with the assistance of the Farm Business Survey in Wales. The information sought included: the physical and mental health status of farmers and their spouses; use of health services; barriers to accessing healthcare; background details such as gender, age and marital status. Chapter 3 gives a detailed account of how the health survey was conducted along with the results relating to the socio-demographic details of respondents.

This chapter presents results from Sections A and B of the questionnaire that focussed on health care service utilisation, barriers to health service utilisation, and illnesses. The next section begins by examining the prevalence of various illnesses among the study sample: comparisons are made to those reported in the 1998 Welsh Health Survey. Subsequent sections examine the use of health services and the barriers to health service use among the study sample.

Welsh Health Survey

Results from the Welsh Health Survey were published for a wide variety of medical conditions and presented by health authority area, and a combination of gender and age categories (18 to 64, 65 to 74, and over 75) (NAfW, 1999). Since only a small number of respondents from the study sample were in the upper age categories, comparisons between the Welsh Health Survey and the study sample are mainly for the 18 to 64 age group.

6.3   Results

6.3.1   Frequencies for reported medical conditions

Six questions asked respondents to indicate illnesses and disabilities for which they had undergone treatment by a doctor. Five of the questions covered specific categories of disease (heart, cancer, respiratory, diabetes, mental/nervous) while the sixth covered a number of different conditions (arthritis, back pain, epilepsy and fits, stroke, Parkinson's disease, pressure/bed sores, varicose veins). Questions were based on the Welsh Health Survey undertaken in 1998 to allow comparisons to be made (NAfW, 1999). Responses to the six questions are presented in the following section.

Heart related conditions

A single question asked respondents to indicate whether they had been treated for any of the following heart related conditions: angina, heart attack (coronary), heart failure, high blood pressure (or hypertension), and/or another heart disease. Multiple responses were allowed. Table 6.1 shows that overall 23 respondents (11.8%) had been treated for at least one heart related condition. The proportion of principal farmers and farmers' spouses that had been treated was very similar at 12.5% and 10.8% respectively (Table 6.1). Closer inspection of the data revealed that three principal farmers had been treated for two heart conditions, while two farmers' spouses had been treated for two or more heart conditions. The most common heart condition was high blood pressure, which was reported by eleven principal farmers (9.8%) and nine farmers' spouses (10.8%).

The proportion of adults aged between 18 and 64 in the study survey sample that suffered from a heart-related condition was similar to that recorded in the Welsh Health Survey for both males and females (Figures 6.1a and 6.1b).

Table 6.1. Frequency distributions for medical conditions treated by a doctor by type and total number, by respondent classification. n, number of respondents; percentages may not sum to 100 due to rounding.

Medical condition	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	n	%	n	%	n	%
Heart related	23	11.8	14	12.5	9	10.8
Cancer	7	3.6	3	2.7	4	4.8
Respiratory	16	8.2	7	6.3	9	10.8
Diabetes	3	1.5	2	1.8	1	1.2
Other (see text for details)	81	41.5	48	42.9	33	39.8
Mental or nervous illness	12	6.2	7	6.3	5	6.0

Cancer

Respondents were asked to indicate whether they had been treated for the following types of cancer: lung cancer, breast cancer, bowel cancer, skin cancer, and/or another kind of cancer. Multiple responses were allowed. Overall, seven respondents (3.6%) indicated that they had been treated for cancer (Table 6.1). Three cases of skin cancer were reported (two principal farmers, one farmers' spouse) with an additional four cases classified as "another kind of cancer" (one principal farmer, three farmers'

spouses). The proportion of farmer's spouses affected by cancer (4.8%) was greater than that for principal farmers (2.8%), although actual numbers were small.

The proportion of males aged between 18 and 64 in the study survey sample that suffered from cancer (2%) was the same as that reported in the Welsh Health Survey (Figure 6.1c). For females, the proportion suffering from cancer was 5% for the survey sample compared to 4% recorded in the Welsh Health Survey (Figure 6.1d).

Respiratory conditions

Respondents were asked to indicate whether they were at present suffering from any of the following chest/breathing difficulties: asthma, cystic fibrosis, emphysema, pleurisy, tuberculosis, bronchitis (over three years), and/or another chest or breathing problem. Multiple responses were allowed. Overall, sixteen respondents (8.2%) indicated that they suffered from at least one of these conditions (Table 6.1). The proportion of respondents affected by a respiratory condition was higher for farmers' spouses (10.8%) than for principal farmers (6.3%). Closer inspection of the data revealed that asthma accounted for twelve (75%) of the cases of chest/breathing problems reported by respondents.

The proportion of males aged between 18 and 64 in the study survey sample that suffered from a respiratory illness (6%) was considerably lower than that reported in the Welsh Health Survey (20%) (Figure 6.1e). Similarly, the proportion of females in the survey sample suffering from a respiratory illness (10%) was also much lower than that recorded in the Welsh Health Survey (19%) (Figure 6.1f).

Mental/nervous disorder

A single item asked respondents to indicate whether they currently had a mental or nervous illness that they had suffered for three months or longer. The five responses provided were: depression, anxiety, Alzheimer's disease, schizophrenia, another mental or nervous disorder. Multiple responses were allowed. No respondents indicated schizophrenia or "another mental or nervous disorder"; Table 6.2 summarises the frequencies of the other responses.

Twelve respondents indicated that they were suffering form at least one mental/nervous disorder (Table 6.1). Closer inspection of the data revealed that two principal farmers and a farmer's spouse had two conditions and one principal farmer

had three. Nevertheless, the numbers of principal farmers and farmers' spouses affected by these conditions was low, with similar proportions for each.

Table 6.2. Frequency distributions for mental and nervous disorders among principal farmers and farmers' spouses in the survey. n, number of respondents.

Mental / nervous disorder	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	n	%	n	%	n	%
Depression	8	4.1	5	4.5	3	3.6
Anxiety	8	4.1	5	4.5	3	3.6
Alzheimer's disease	1	0.5	1	0.9	0	0

The proportion of adults aged between 18 and 64 in the study survey sample that suffered from a mental illness (males: 6%; females: 5%) was considerably lower than that recorded in the Welsh Health Survey (males: 11%; females: 15%) (Figures 6.1g and 6.1 h).

Diabetes

A single question asked respondents to indicate whether they suffered from diabetes and, if so, whether it was treated by injection, tablets, or diet only. Only three respondents (two principal farmers, one farmers' spouse) indicated that they suffered from diabetes. The two principal farmers were treated respectively by using tablets and diet only, while the farmer's spouse required injections.

The proportion of adults aged between 18 and 64 in the study survey sample that suffered from diabetes was very low (males: 2%; females 1%) and was similar to that recorded in the Welsh Health Survey (males: 3%; females: 2%) (Figures 6.1i and 6.1j).

Other medical conditions

In addition to questions regarding specific categories of illness/disease, there was a single item that asked respondents to indicate whether they suffered from any of the following conditions: arthritis, back pain, epilepsy or fits, stroke, Parkinson's disease, pressure/bed sores, varicose veins. There were no reported instances of epilepsy, stroke, or pressure/bed sores and Table 6.3 summarises the frequencies of the other conditions for the whole sample, principal farmers, and farmers' spouses.

Figure 6.1. The proportion (%) of adults aged 18 to 64 suffering from various medical conditions for the Farm Family Health Project (shaded columns) survey sample (males: n = 100; females: n = 79) and respondents to the 1998 Welsh Health Survey (non-shaded columns) (n > 28,000).

(a) Heart Males
(b) Heart Females
(c) Cancer Males
(d) Cancer Females
(e) Respiratory Illness Males
(f) Respiratory Illness Females
(g) Mental Illness Males
(h) Mental Illness Females
(i) Diabetes Males
(j) Diabetes Females
(k) Back Pain Males
(l) Back Pain Females
(m) Arthritis Males
(n) Arthritis Females
(o) Varicose Veins Males
(p) Varicose Veins Females

Figure notes
FFHP: Farm Family Health Project (i.e. current study).
WHS: Welsh Health Survey, conducted in 1998. Source: NAfW, 1999 (p.41).

Table 6.3. Frequency distributions for arthritis, back pain, Parkinson's disease, and varicose veins for principal farmers and farmers' spouses in the survey. n, number of respondents.

	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	n	%	n	%	n	%
Arthritis	35	17.9	25	22.3	10	12.0
Back pain	52	26.7	33	29.5	19	22.9
Parkinson's disease	1	0.5	1	0.9	0	0
Varicose veins	10	5.1	2	1.8	8	9.6

Eighty-one respondents reported that they were suffering from at least one condition classed as "other" (Table 6.1). Closer inspection of the data revealed that eleven principal farmers and four farmers' spouses were suffering from two conditions and one principal farmer from three. The most frequently reported medical condition among both principal farmers and farmers' spouses was back pain (Table 6.3). A slightly higher proportion of principal farmers (29.5%) were affected compared to farmers' spouses (22.9%) (Table 6.3). Arthritis was a relatively common condition among principal farmers with almost a quarter (22.3%) being affected, nearly twice the rate reported among farmers' spouses (12.0%).

A comparison between the survey sample and the 1998 Welsh Health Survey for back pain, arthritis, and varicose veins showed that rates were of as similar magnitude. High rates of back pain found among the survey sample (males: 30%; females: 22%) were similar to those reported in the Welsh Health Survey (males: 29%; females: 28%) (Figures 6.1k and 6.1l). The relatively high prevalence of arthritis among the survey sample (males: 22%; females: 13%) was also found among respondents to the Welsh Health Survey (males: 16%; females: 18%) (Figures 6.1m and 6.1n).

Total number of medical conditions reported

To see how many respondents had multiple illnesses/medical conditions the number of illnesses/medical conditions for each respondent was added together. No distinction was made between respondents where multiple responses were within one category and those which indicated suffering illnesses in two or more categories. The results show that 83 respondents (42.6%) reported that they were not suffering from any medical conditions at all, while a further 76 (39.0%) indicated that they suffered from one (Table 6.4). The remaining 36 respondents (18.5%) reported two or more medical

conditions (Table 6.4). Instances of suffering from more than one condition occurred in similar proportions for principal farmers (19.7%) and farmers' spouses (16.8%) (Table 6.4).

Table 6.4. Frequency distributions for medical conditions treated by a doctor by type and total number, for principal farmers and farmers' spouses in the survey. n, number of respondents; percentages may not sum to 100 due to rounding.

	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	n	%	n	%	n	%
Total number of medical conditions reported						
No medical conditions	83	42.6	45	40.2	38	45.8
1 medical condition	76	39.0	45	40.2	31	37.3
2 medical conditions	20	10.3	14	12.5	6	7.2
3 medical conditions	11	5.6	5	4.5	6	7.2
4 medical conditions	4	2.1	2	1.8	2	2.4
5 medical conditions	1	0.5	1	0.9	0	0

Accidents

Two items asked survey respondents to indicate whether they had suffered any injuries as a result of an accident in the past three months: one referred to those requiring treatment at an accident and emergency casualty unit, while the other referred to those that did not require hospital treatment. The questionnaire also asked respondents to indicate where the accident occurred. The four possible responses were: "in the home"; "in traffic"; "on the farm"; or "somewhere else".

Ten principal farmers (8.9%) had suffered accident-related injuries in the past three months that required hospital treatment (Figure 6.2a). Nine incidents occurred on the farm; fractured bones were the most common injury reported (Figure 6.2b). There were no instances of farmers' spouses having accidents that required hospital treatment. The proportion of male respondents aged between 25 and 64 that reported a break or fracture was substantially higher in the Farm Family Health Project than for respondents to the 1998 Welsh Health Survey (Table 6.5). While the proportion of males aged between 65 and 74 suffering a cut or puncture requiring hospital treatment was much higher for respondents to the Farm Family Health Project, compared to the 1998 Welsh Health Survey, the number of respondents was very small (Table 6.5).

Accident-related injuries that did not require hospital treatment were much more common: a total of 46 were reported among survey respondents (principal farmers: 37;

farmers' spouses: 9) (Figure 6.2a). Twenty-nine incidents (78.4%) occurred on the farm; the majority of these were classed as cuts or punctures (Figure 6.2b).

Figure 6.2. Frequency distribution for injuries suffered in the past 3 months for principal farmers and farmers' spouses: (a) injuries suffered in all locations; (b) injuries suffered on the farm.
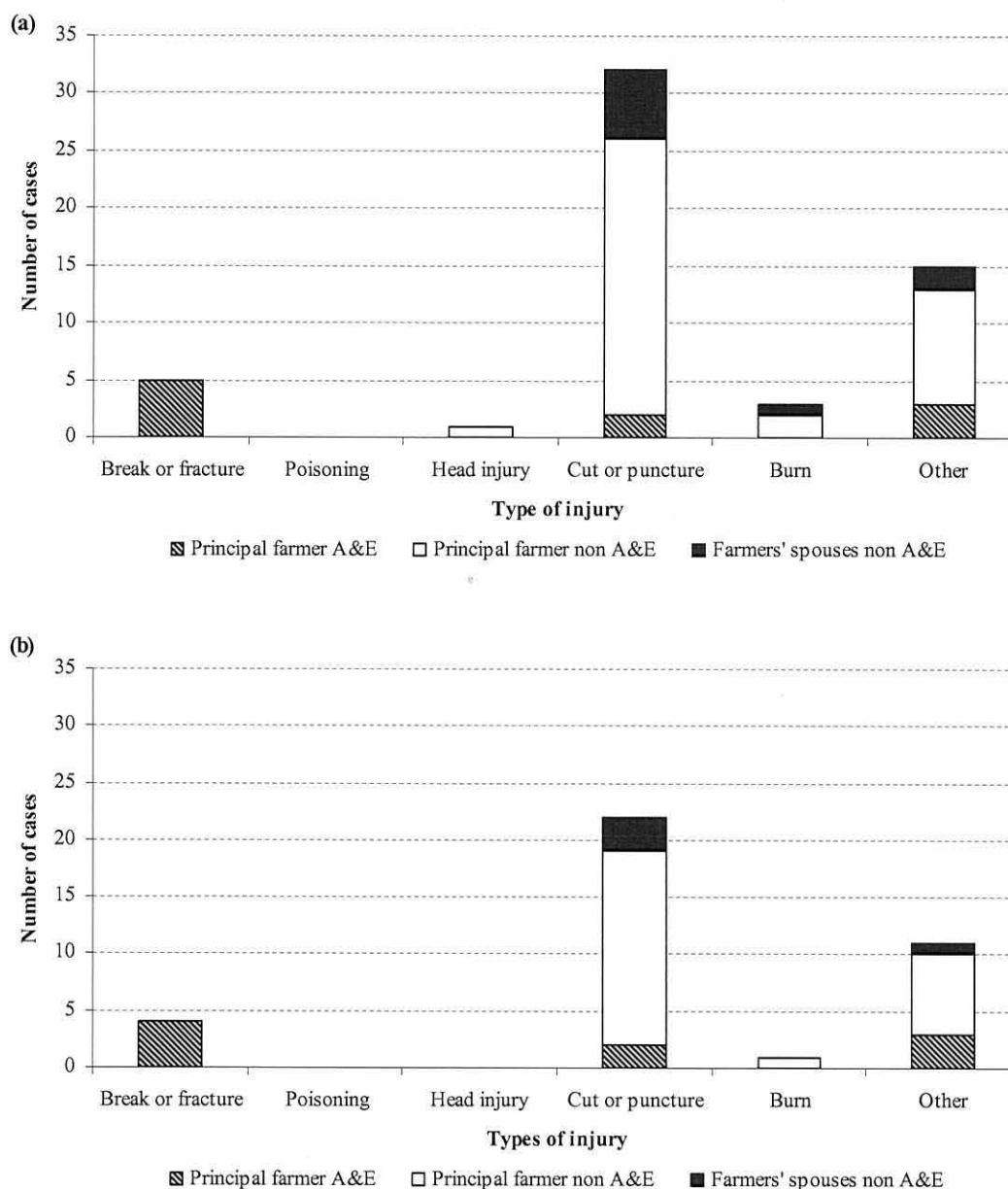
Figure notes
Principal Farmer A&E: Injuries suffered by principal farmers that required hospital treatment.
Principal Farmer non A&E: Injuries suffered by principal farmers that did not require hospital treatment.
Farmers' spouses A&E: Injuries suffered by farmers' spouses that required hospital treatment.
Farmers' spouses non A&E: Injuries suffered by farmers' spouses that did not require hospital treatment.

Table 6.5 Proportion (%) of male respondents to the Farm Family Health Project (FFHP) and 1998 Welsh Health Survey (WHS) who reported having had an accident, injury or poisoning in the three months prior to survey questionnaire completion.

	Age of male respondent (years)			
	25-64		65-74	
	FFHP	WHS	FFHP	WHS
Number of respondents[a]	100	9,299	9	1,514
Injury				
Break or fracture	5.0	2.0	-	1.6
Cut or puncture	1.0	2.4	11.1	0.9
Head injury	-	0.7	-	0.3
Burn	-	0.4	-	0.2
Poisoning	-	0.2	-	0.2
Other	3.0	3.9	-	1.6

Table notes
FFHP: Farm Family Health Project (i.e. current study).
WHS: Welsh Health Survey, conducted in 1998. Source: NAfW, 1999 (p.17).
a: All respondents to the Farm Family Health Project were principal farmers.
-:   Empty cell.

6.3.2   Use of health services

6.3.2.1 Contact with family doctor / General Practitioner (GP)

Respondents were asked to indicate when they had last talked to their family doctor (GP) about their own health. The four options presented were: the past three months; between three and twelve months; over twelve months or never; not registered with a doctor. The results showed that overall 65.1% of respondents had spoken to their doctor in the previous twelve months, compared to 78.8% of respondents to the 1998 Welsh Health Survey (Table 6.6). The proportion of both male and female survey respondents that had not spoken to their doctor about their own health in the previous twelve months was substantially higher for the Farm Family Health Project survey than for the 1998 Welsh Health Survey (Table 6.6).

Respondents were also asked to indicate the number of times that they had spoken to their family doctor in the previous twelve months and whether their last contact had been by telephone, a visit to the doctor's surgery, or through a home visit by their doctor. A considerable proportion of principal farmers (39%) and farmers' spouses (29%) had no contact with their family doctor in the previous twelve months (Figure 6.3). Around half of all respondents (principal farmers: 46%; farmer's spouses: 51%) had seen their doctor between one and three times in a year, while approximately 20% (principal farmers: 16%; farmer's spouses: 20%) had seen their doctor more than three times (Figure 6.3). The last contact with the family doctor, for those respondents

that had spoken to their doctor at least once in the past twelve months, had mainly been at the doctor's surgery (95%) compared to only 2% by telephone and 2% through home visits. The mean number of contacts with the family doctor in the past 12 months is presented for survey respondents by socio-demographic variables (Table 6.7).

Table 6.6 Proportion (%) of respondents to Farm Family Health Project (FFHP) and 1998 Welsh Health Survey (WHS) having last contact with their family doctor 3 months, 3 to 12 months, and over 12 months prior to survey questionnaire completion.

| | | | Respondents' last contact with family doctor (GP) | | | | | |
| | | | Past 3 months (%) | | Past 3-12 months (%) | | Over 12 months ago or never (%) | |
	n^1	n^2	FFHP	WHS	FFHP	WHS	FFHP	WHS
Overall								
All respondents	195	29,352	34.9	47.2	30.3	31.3	34.9	21.2
Gender								
Male	111	14,163	29.7	40.6	30.6	31.4	39.6	27.6
Female	84	15,188	41.7	53.3	29.8	31.2	28.6	15.3
Age[a]								
18 – 65	179	21,797	35.2	43.5	31.3	32.6	33.5	23.6
65 – 74	12	3,426	41.7	57.8	16.7	27.2	41.7	14.9
75+	1	2,837	-	60.7	-	26.9	100.0	12.3

Table notes
Percentages may not sum to 100 due to rounding. In addition, 0.3% of respondents to the 1998 Welsh Health Survey (zero for Farm Family Health Project) were recorded as "not registered with a doctor" and consequently they are not included in the above figures.
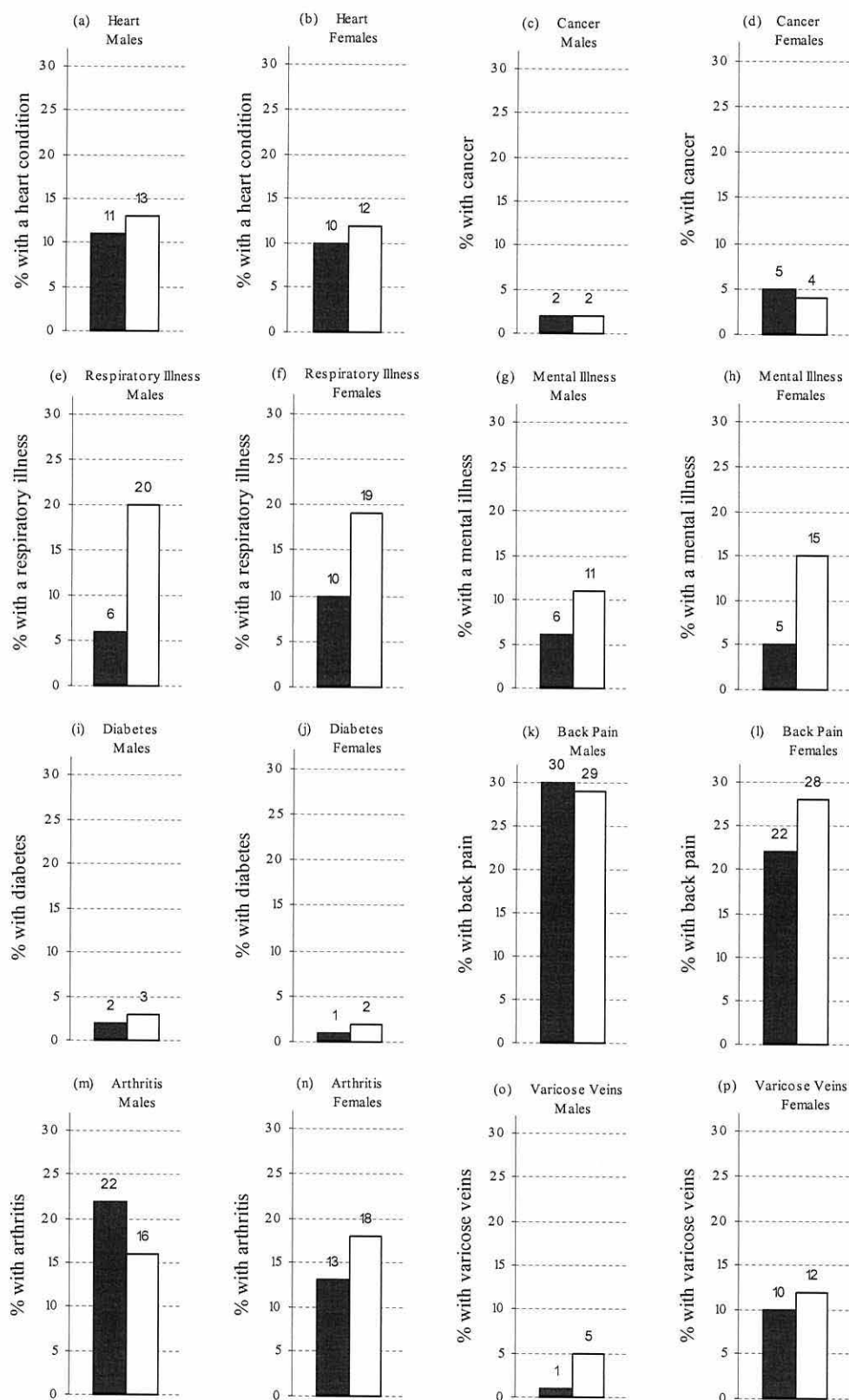FFHP: Farm Family Health Project (i.e. current study).
WHS: Welsh Health Survey, conducted in 1998. Source: NAfW, 1999 (p.24).
n^1:   Number of respondents in Farm Family Health Project.
n^2:   Number of respondents in the 1998 Welsh Health Survey.
-:   Empty cell.

Figure 6.3. Number of contacts with the family doctor (GP) for survey respondents over the past 12 months.
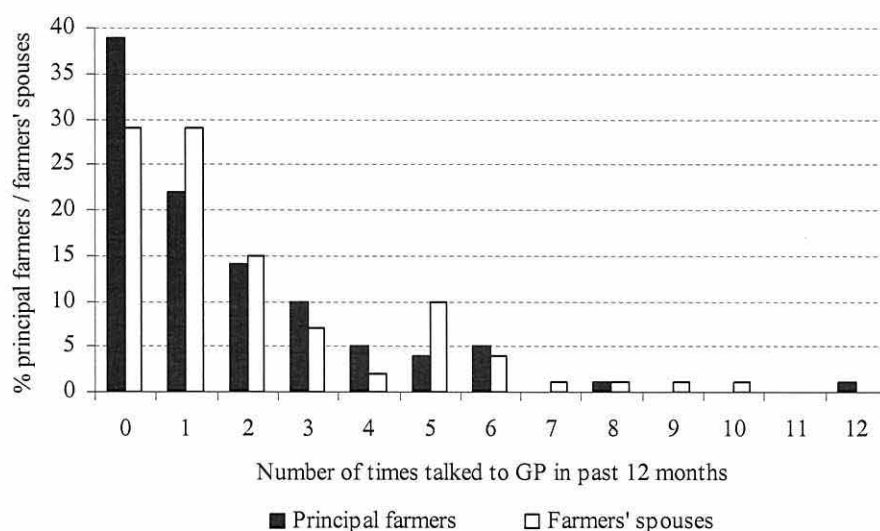
Table 6.7. Mean number of times (MT) that principal farmers and farmers' spouses had spoken to their GP in the in the past 12 months, presented by selected socio-demographic variables. number of respondents; s.e., standard error of the mean.

	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	MT	s.e.	MT	s.e.	MT	s.e.
All respondents						
Overall	1.77	0.15	1.61	0.19	2.00	0.25
Gender of respondents						
Male	1.60	0.20	1.60	0.20	-	-
Female	2.00	0.25	2.00	-	2.00	0.25
Age of respondents						
18 – 24	-	-	-	-	-	-
25 – 34	1.78	0.64	1.00	-	1.88	0.72
35 – 44	1.45	0.20	0.95	0.19	2.00	0.35
45 – 54	1.50	0.33	1.21	0.35	1.85	0.59
55 – 64	2.49	0.35	2.49	0.41	2.50	0.69
65+	1.69	0.59	1.80	0.74	1.33	0.88
Questionnaire version						
English	1.69	0.16	1.51	0.19	1.93	0.28
Welsh	2.07	0.39	1.93	0.53	2.31	0.58
Marital status						
Single	1.00	0.44	1.00	0.44	-	-
Separated	-	-	-	-	-	-
Married	1.78	0.16	1.62	0.21	1.98	0.25
Divorced	2.00	-	2.00	-	-	-
Co-habiting	2.00	0.16	1.33	1.33	4.00	-
Widowed	6.00	-	6.00	-	-	-
Children						
No children in household	2.18	0.26	2.24	0.32	2.06	0.47
Children present in household	1.42	0.17	0.93	0.17	1.96	0.28
Alcohol consumption (units per week)						
None	2.13	0.33	1.86	0.47	2.29	0.45
1 to 7	1.73	0.21	1.57	0.26	1.98	0.33
8 to 14	1.00	0.43	1.36	0.70	0.50	0.27
15 to 21	1.50	0.45	1.18	0.35	5.00	-
22 to 35	1.50	0.50	1.50	0.50	-	-
36 to 50	3.00	1.73	3.00	1.73	-	-
51 or more	-	-	-	-	-	-
Tobacco usage						
I have never smoked	1.59	0.17	1.37	0.20	1.84	0.28
I smoke daily	1.00	0.41	1.00	0.41	-	-
I smoke occasionally, but not every day	2.08	0.62	2.00	0.93	2.20	0.86
I used to smoke daily, but do not smoke at all now	2.91	0.71	2.78	0.78	3.50	1.89
I used to smoke occasionally, but do not smoke at all now	1.81	0.36	1.25	0.31	2.56	0.69

Table 6.7. (continued)

	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	MT	s.e.	MT	s.e.	MT	s.e.
Number of medical conditions						
0	1.25	0.21	0.93	0.23	1.66	0.37
1	2.03	0.23	1.82	0.27	2.32	0.41
2	2.60	0.64	3.14	0.84	1.33	0.62
3	2.82	0.78	2.00	1.10	3.50	1.12
4	1.00	0.41	1.00	1.00	1.00	<0.00
5	0	-	0	-	-	-

Gender of respondents

The mean frequency of visits to the family doctor was slightly higher for females (2.00) in the survey compared to males (1.60), though the difference was not statistically significant (Tables 6.7 and 6.9).

Age of respondents

For principal farmers the number of contacts with the doctor increased with age and differences between age categories were statistically significant (Table 6.9). The relationship between age and number of contacts with the family doctor was less pronounced for farmers' spouses and was not significantly different between age categories (Tables 6.7 and 6.9).

Questionnaire language

For both principal farmers and farmers' spouses the mean number of contacts was higher for those that had completed the Welsh version of the questionnaire, although neither difference was statistically significant (Tables 6.7 and 6.9).

Marital status

The lowest mean number of contacts with the family doctor was recorded for single males (Table 6.7). Nevertheless, care should be exercised in interpreting differences between groups of differing marital status since most (other than married) contain small numbers of respondents (Tables 3.9 and 6.7). Differences in the mean number of contacts with the family doctor between groups were not statistically significant (Table 6.9).

Household role

No clear pattern emerged for principal farmers with regard to their mean number of contacts with the family doctor and their household role (Table 6.8). For farmers' spouses the highest mean number of contacts with the family doctor was for those looking after the household and helping occasionally on the farm (Table 6.8). Differences between household roles were not statistically significant for either principal farmers or farmers' spouses (Table 6.9).

Table 6.8. Mean number of times (MT) that principal farmers and farmers' spouses had spoken to their GP in the in the past 12 months, presented by household role. number of respondents; s.e., standard error of the mean.

	All respondents (n = 195)		Principal farmers (n =112)		Farmers' spouses (n = 83)	
Role	MT	s.e.	MT	s.e.	MT	s.e.
1	1.60	0.19	1.67	0.21	1.26	0.33
2	1.00	0.35	1.10	0.50	0.80	0.37
3	1.67	0.67	1.75	1.11	1.60	0.93
4	1.82	0.62	-	-	1.82	0.62
5	2.70	0.45	-	-	2.70	0.45

Table key
Household roles:
1:   I spend most of my time on the farm.
2:   I spend most of my time on the farm and also have an off-farm job.
3:   I split my time equally between the farm and an off-farm job.
4:   I look after the household and have an off-farm job.
5:   I look after the household and help occasionally on the farm.

Children

For both principal farmers and farmers' spouses the number of contacts with the family doctor was higher for those living in households without children (Table 6.7). This reflects the findings of Chapter 3 that respondents living in households without children tended to be older, and that physical health was negatively correlated to age. The difference in mean number of visits was statistically significant for principal farmers though not for farmers' spouses (Table 6.9).

Alcohol consumption

Interestingly, the mean number of contacts with the family doctor was bimodal with peaks at the lowest and highest ends of the alcohol consumption range (Table 6.7). However, differences were not statistically significant for either principal farmers or farmers' spouses (Table 6.9).

Table 6.9. Results of statistical tests on mean number of times that principal farmers and farmers' spouses had spoken to their GP in the in the past 12 months for selected socio-demographic variables. n, number of respondents; s.e., standard error of the mean.

Variable/test undertaken	All respondents		Principal farmers		Farmers' spouses	
	Statistic	Sig	Statistic	Sig	Statistic	Sig
GP Contacts						
Gender of respondents						
M-W Test (Asymp Sig 2-tailed)	0.167	No	0.499	No	n/a	n/a
Age of respondents						
K-W Test (Asymp Sig)	0.067	No	0.027	Yes*	0.837	No
Questionnaire language						
M-W Test (Asymp Sig 2-tailed)	0.472	No	0.758	No	0.380	No
Marital status						
K-W Test (Asymp Sig)	0.391	No	0.389	No	0.274	No
Household role						
K-W Test (Asymp Sig)	0.140	No	0.669	No	0.311	No
Children						
M-W Test (Asymp Sig 2-tailed)	0.054	No	0.001	Yes**	0.599	No
Alcohol consumption						
K-W Test (Asymp Sig)	0.230	No	0.779	No	0.071	No
Tobacco usage						
K-W Test (Asymp Sig)	0.397	No	0.606	No	0.448	No
Medical conditions						
K-W Test (Asymp Sig)	0.004**	Yes	0.007**	Yes	0.133	No

Table notes
M-W Test: Mann-Whitney U Test.
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between SF-36 scores for groups within the variable concerned. 'No' indicates $p>0.05$.
**   Significant at the 0.01 level.
*   Significant at the 0.05 level.
n/a: Not applicable. Only one group for respondent classification of demographic variable considered.

Tobacco usage

There was no overall relationship pattern between tobacco usage and contact with the doctor, although contact was greatest for those who had previously smoked daily but had now stopped smoking (Table 6.7). Differences in the mean number of contacts between tobacco usage categories were not statistically significant for either principal farmers or farmers' spouses (Table 6.9).

Medical conditions

Overall, respondents that had a greater number of medical conditions contacted their doctor more frequently, except for the small number (n = 5) that had more than three medical conditions (Table 6.7). For principal farmers the greatest number of contacts was for those that had two medical conditions, while for farmers' spouses it was those with three (Table 6.7). The difference in mean number of visits was statistically significant for principal farmers, though not for farmers' spouses (Table 6.9).

Distance to doctor's surgery

The distance to the doctor's surgery for the 125 households represented in the survey ranged from one to sixteen miles, with a mean of 5.9 miles (median 6.0 miles). The distance that respondents lived from their family doctor's surgery was plotted against the number of contacts with their doctor in the previous twelve months (Figure 6.4). The plotted trend line suggests that the frequency of contact with the doctor increases as distance from the doctor's surgery increases (Figure 6.4). Regression analysis was therefore used to investigate whether distance to the doctor's surgery was a significant factor in explaining the variation in the frequency with which respondents contacted their family doctor. A linear regression was used with the following functional form:

$$Y_i = b_1 + b_2X_{2i} + b_3X_{3i} + b_4X_{4i} + b_5X_{5i} + b_6X_{6i} + b_7X_{7i} + b_8X_{8i} + u_i$$

For observation *i*, Y represents the dependent variable (frequency of contact with the family doctor), b_1 is a constant, X_2 to X_8 are explanatory variables with coefficients b_2 to b_8 respectively, and u is the error term.

Figure 6.4 Distance to GP's surgery plotted against number of contacts in past 12 months for all survey respondents (n = 194).
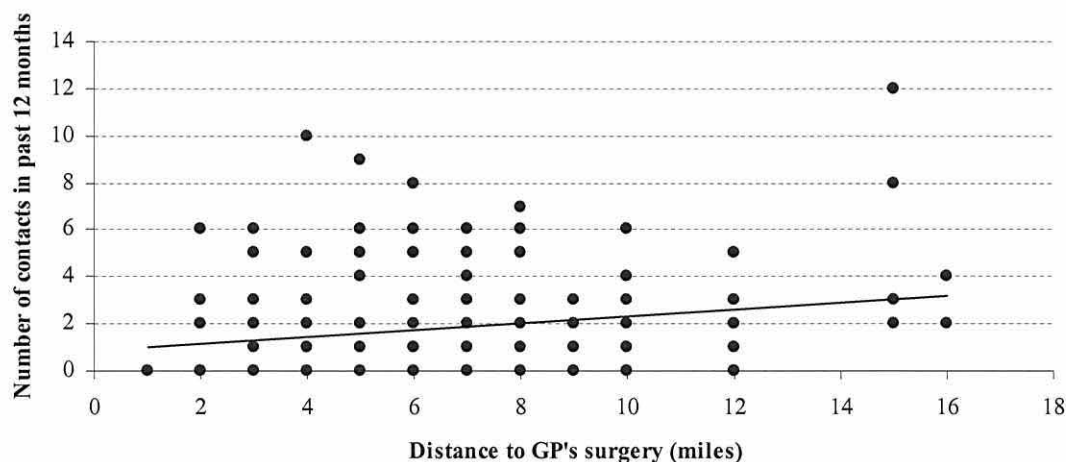
The results of the regression analysis are shown in Table 6.10. While the coefficient for distance to doctor's surgery was positive, it was not statistically significant at the five percent level (Table 6.10). Similarly, the coefficients for gender, age, the presence of children in the household, whether the respondent had a medical condition, gender, age, SF-36 mental (MCS) health summary score, and whether the respondent was married, were not significantly different to zero (Table 6.10). However, the coefficient for the respondent's SF-36 physical (PCS) health summary score was negative and statistically significant. This was as expected, since respondents with low PCS scores (indicating poor physical health) would be expected to have a greater number of contacts with the family doctor. The R^2 of 0.13 for the resultant regression equation indicates that the variables in the model only explain 13% of the variation in the number of GP contacts between respondents.

The regression analysis was repeated with respondents' MCS scores and whether respondents were married, removed (Table 6.11). The results show that the only significant variable in the modified regression was the respondents' PCS score (Table 6.11). The R^2 for the modified regression remained at 0.13. This regression was also repeated after removing the two outlying observations to the "North-East" of the scatter diagram (distance 15, number of contacts 8 and 12 respectively). The results were not significantly different.

Table 6.10. Results of first regression analysis for frequency of contact with the family doctor (dependent variable) against distance to doctor's surgery and other selected socio-economic variables, for all survey respondents (n = 190). * statistically significant at the 0.05 level, ** statistically significant at the 0.01 level.

Coefficients	Coefficients	t	Sig
Constant	4.730	2.179	0.031 *
Distance to doctor's surgery	0.095	1.863	0.064
SF-36 physical health summary score (PCS)	-0.051	-2.641	0.009 **
Children in household (0: No; 1: Yes))	-0.710	-1.362	0.175
Medical condition (0: No; 1: Yes)	0.457	1.366	0.174
Gender (0: Male; 1: Female)	0.346	1.077	0.283
Age	-0.021	-0.798	0.426
SF-36 mental health summary score (MCS)	<0.000	-0.004	0.997
Marriage indicator	0.062	0.101	0.920

Table 6.11. Results of second regression analysis for frequency of contact with the family doctor (dependent variable) against distance to doctor's surgery and other selected socio-demographic variables, for all survey respondents (n = 190). * statistically significant at the 0.05 level, ** statistically significant at the 0.01 level.

Coefficients	Coefficients	t	Sig
Constant	4.739	2.395	0.018 *
Distance to doctor's surgery	0.096	1.917	0.057
SF-36 physical health summary score (PCS)	-0.051	-2.655	0.009 **
Children in household (0: No; 1: Yes))	-0.692	-1.417	0.158
Medical condition (0: No; 1: Yes)	0.460	1.397	0.164
Gender (0: Male; 1: Female)	0.353	1.124	0.263
Age	-0.020	-0.798	0.426

Parkin (1979), suggested that patients from the London borough of Lambeth were deterred from visiting their doctor by the distance to the surgery, except for males aged 15 to 64. Groups with the highest utilisation rates (women, the elderly, and those from lower social classes) were particularly affected. In the present study the average number of contacts with the family doctor was higher for women than men, though the difference was not statistically significant (Tables 6.7 and 6.9). While Parkin's study looked at an urban population cohort, the regression analysis for the present study was repeated for both males and females separately under 65 years old after the two outliers described above were removed. The results showed that the only significant variable for both males and females was the SF-36 physical (PCS) health summary score (Tables 6.12 and 6.13).

Table 6.12. Results of regression analysis for frequency of contact with the family doctor (dependent variable) against distance to doctor's surgery and other selected socio-economic variables, for male survey respondents, under 65 years old with outlier removed (n = 97). * statistically significant at the 0.05 level.

Coefficients	Coefficients	t	Sig
Constant	3.318	1.464	0.147
Distance to doctor's surgery	0.030	0.476	0.635
SF-36 physical health summary score (PCS)	-0.049	-2.215	0.029 *
Children in household (0: No; 1: Yes))	-0.738	-1.533	0.129
Medical condition (0: No; 1: Yes)	0.441	1.201	0.233
Age	0.014	0.490	0.625

Table 6.13. Results of regression analysis for frequency of contact with the family doctor (dependent variable) against distance to doctor's surgery and other selected socio-economic variables, for female survey respondents, under 65 years old with outlier removed (n = 77). * statistically significant at the 0.05 level.

Coefficients	Coefficients	t	Sig
Constant	9.049	2.417	0.018 *
Distance to doctor's surgery	-0.079	-0.921	0.360
SF-36 physical health summary score (PCS)	-0.073	-2.433	0.017 *
Children in household (0: No; 1: Yes))	-0.515	-0.525	0.601
Medical condition (0: No; 1: Yes)	0.242	0.452	0.653
Age	-0.057	-1.042	0.301

6.3.2.2 Contact with other (non-GP) heath professionals

Respondents were asked to indicate how often they had contact with other health care professionals, including nurses, counsellors, health visitors, community psychiatric nurses, and physiotherapists. Over seventy percent of principal farmers and sixty percent of farmers' spouses had not seen any of the health care professionals listed above in the previous twelve months. Only eleven percent of principal farmers and sixteen percent of farmers' spouses had seen a health care professional more than once over the past twelve months (Figure 6.5).

Figure 6.5. The number of contacts with medical practitioners (nurses, counsellors, health visitors, community psychiatric nurses, and physiotherapists), other than the family doctor for all survey respondents (n = 192) over the past 12 months. Percentages may not sum to 100 due to rounding.
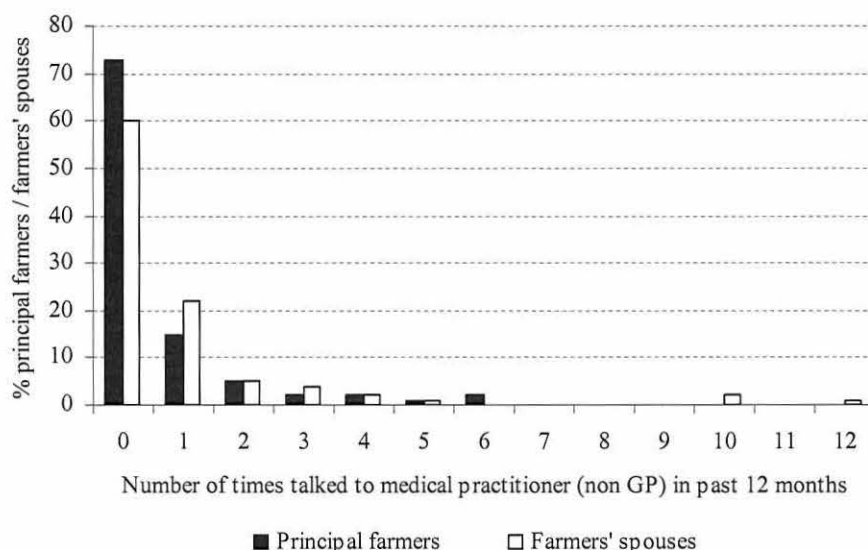
6.3.2.3 Visits to hospital

Respondents were asked to indicate when they had last been to hospital and received treatment as an out-patient (going home the same day), and/or as a casualty in an accident and emergency department, and/or as an in-patient (stay overnight or longer). The three options presented were: the past three months; between three and twelve months; over twelve months or never. Respondents were also asked to indicate the number of times over the past twelve months that they had been to hospital as an out-patient, casualty, and/or in-patient. Around three-quarters of all respondents had not been to hospital as an out-patient in the previous twelve months, a slightly higher proportion than for respondents to the 1998 Welsh Health Survey (Tables 6.14 and 6.15). A relatively small proportion of principal farmers (6.3%) and farmers' spouses (8.4%) had been three or more times (Table 6.14). Around ninety percent of respondents had not stayed overnight (or longer) in hospital in the previous twelve months (Tables 6.14 and 6.15). Once again, this was a slightly higher proportion than for respondents to the 1998 Welsh Health Survey (Table 6.15).

The proportion of farmers' spouses that had used a casualty departments was small (6.0%) and much lower than for principal farmers (17.9%) (Table 6.14). A smaller proportion of respondents to the Farm Family Health Project (87.1%) had been to a hospital casualty department compared to respondents to the 1998 Welsh Health Survey (80.2%) (Table 6.15).

Distance to nearest hospital accident and emergency unit

Respondents were asked to estimate the distance from their home to the nearest hospital accident and emergency unit. Distances ranged from three to fifty miles for the 125 households that were represented in the survey. The mean distance was 16.3 miles (standard error: 1.016) and the median was 12 miles. Using an average road speed of 30 miles per hour, 59% of respondents were within 30 minutes driving time of an accident and emergency unit, 29% between 30 and 60 minutes, and 12% over 60 minutes.

Table 6.14. Frequency distributions of visits to hospital as out-patient, in-patient and for accident and emergency in the past 12 months for principal farmers and farmers' spouses. n, number; percentages may not sum to 100 due to rounding.

Type of service / number of times used in past 12 months with respect to own health	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	n	%	n	%	n	%
Hospital out-patient						
0	144	73.8	83	74.1	61	73.5
1	24	12.3	17	15.2	7	8.4
2	10	5.1	4	3.6	6	7.2
3+	14	7.15	7	6.3	7	8.4
Missing	3	1.5	1	0.9	2	2.4
Accident and emergency (A&E)						
0	169	86.7	92	82.1	77	92.8
1	19	9.7	14	12.5	5	6.0
2	3	1.5	3	2.7	-	-
3	3	1.5	3	2.7	-	-
Missing	1	0.5	-	-	1	1.2
Hospital in-patient						
0	178	91.3	104	92.9	74	89.2
1	15	7.7	7	6.3	8	9.6
2	1	0.5	1	0.9	-	-
Missing	1	0.5	-	-	1	1.2

Table 6.15 Proportion (%) of respondents to Farm Family Health Project (FFHP) and 1998 Welsh Health Survey (WHS) that were treated in hospital as: (a) an out-patient, (b) in a hospital accident and emergency department, (c) as an in-patient in the last 3 months, 3 to 12 months, and over 12 months prior to survey questionnaire completion.

	n^1	n^2	Past 3 months (%)		Past 3-12 months (%)		Over 12 months ago or never (%)	
			FFHP	WHS	FFHP	WHS	FFHP	WHS
(a) - Hospital out-patient								
All respondents	190	28,275	11.1	15.7	13.2	14.8	75.8	69.5
Gender								
Male	109	13,798	11.9	14.4	11.9	14.3	76.1	71.4
Female	81	14,477	9.9	17.0	14.8	15.2	75.3	67.8
Age[a]								
18 – 64	179	21,334	10.3	13.5	14.3	14.1	75.4	72.4
65 – 74	11	3,180	27.3	22.4	-	16.1	72.7	61.5
75+	1	2,554	-	24.3	-	18.2	100.0	57.5
(b) - Accident and Emergency (A&E) Department								
All respondents	194	28,033	4.6	7.3	8.2	12.5	87.1	80.2
Gender								
Male	111	13,697	6.3	8.0	10.8	14.0	82.9	78.0
Female	83	14,337	2.4	6.7	4.8	11.1	92.8	82.2
Age[a]								
18 – 64	179	21,290	4.5	7.0	8.9	12.7	86.6	80.3
65 – 74	11	3,084	9.1	7.2	-	10.2	90.9	82.6
75+	1	2,484	-	10.2	-	12.8	100.0	77.0
(c) - Hospital in-patient								
All respondents	194	28,324	1.5	4.7	6.7	8.7	91.8	86.6
Gender								
Male	111	13,769	1.8	4.1	4.5	7.1	93.7	88.8
Female	83	14,555	1.2	5.3	9.6	10.3	89.2	84.4
Age[a]								
18 – 64	179	21,270	1.1	3.6	7.3	7.3	91.6	89.0
65 – 74	11	3,219	9.1	6.8	-	11.8	90.9	81.4
75+	1	2,630	-	10.2	-	14.8	100.0	75.0

Table notes

Percentages may not sum to 100 due to rounding. In addition, 0.3% of respondents to the 1998 Welsh Health Survey (zero for Farm Family Health Project) were recorded as "not registered with a doctor" and consequently they are not included in the above figures.

FFHP: Farm Family Health Project (i.e. current study).
WHS: Welsh Health Survey, conducted in 1998. Source: NAfW, 1999 (p.24).
n^1:   Number of respondents in Farm Family Health Project.
n^2:   Number of respondents in the 1998 Welsh Health Survey.
-:   Empty cell.

6.3.2.4 NHS Direct / use of the internet

Respondents were asked whether they had heard of NHS Direct, a medical advice service that can be accessed by telephone or through the internet twenty-four hours a day. Almost two-thirds (62.5%) of principal farmers and nearly half (45.8%) of farmers' spouses had not heard of NHS Direct, while only around ten percent of those that had heard of NHS Direct had used it (Table 6.16). Around six percent of respondents had sought medical information on the internet (Table 6.16).

Table 6.16. Frequency distributions for whether respondents of the survey had heard of NHS Direct, had used NHS Direct, or had sought medical advice through the internet. n, number; percentages may not sum to 100 due to rounding; a, percentages relate to number that had heard of NHS Direct.

Type of service / number of times used in past 12 months with respect to own health	All respondents (n = 195)		Principal farmers (n = 112)		Farmers' spouses (n = 83)	
	n	%	n	%	n	%
Heard of NHS Direct						
Yes	86	44.1	42	37.5	44	53.7
No	108	55.4	70	62.5	38	45.8
Missing	1	0.5	-	-	1	1.2
Have used NHS Direct [a]						
Yes	10	11.6	4	9.5	6	13.6
No	71	82.6	36	85.7	35	79.5
Missing	5	5.8	2	4.8	3	6.8
Sought medical advice on the internet						
Yes	12	6.2	6	5.4	6	7.3
No	182	93.3	106	94.6	76	92.7
Missing	1	0.5	-	-	1	1.2

6.3.3 Barriers to seeking medical advice or treatment

A single item, divided into nine parts, asked respondents to rate the importance of certain factors when seeking medical advice or treatment. Respondents were presented with a list of nine factors and asked to indicate on a scale of zero to three the importance of each, where zero indicated an "unimportant factor", one indicated a "slightly important factor", two indicated a "moderately important factor", and three indicated a "very important factor". The mean scores for each factor were calculated for both principal farmers and farmers' spouses and presented in order of importance (highest scores/most important first) (Table 6.17).

The results for principal farmers and farmers' spouses were remarkably consistent. Both rated the opening hours of the doctor's surgery the most important factor to be considered when seeking medical treatment or advice, while the second and third most important factors were reversed (Table 6.17). Principal farmers placed slightly more importance on their workload as a factor compared to farmers' spouses (Table 6.17). Principal farmers and farmers' spouses both rated "embarrassment about friends/neighbours knowing that you are ill" as the least important factor (Table 6.17). The "availability of public transport" and "the time of year" both had mean scores of less than one and were not rated as important by respondents (Table 6.17).

Table 6.17 Mean scores indicating the relative importance of various factors considered by respondents when determining whether to seek medical advice or treatment. n, number of respondents.

	n	Mean score
Principal farmers		
Opening hours of your GP's surgery	111	2.11
Your workload	110	1.93
Having to make an appointment to see a doctor	110	1.90
Believing that the doctor will not be able to help you	109	1.45
Believing that the doctor is too busy to see you	109	1.34
Distance to GP's surgery	110	1.33
The time of year	109	0.95
Availability of public transport	107	0.60
Embarrassment about friends/neighbours knowing that you are ill	111	0.30
Farmers' spouses		
Opening hours of your GP's surgery	83	2.13
Having to make an appointment to see a doctor	81	2.12
Your workload	79	1.67
Believing that the doctor will not be able to help you	79	1.47
Believing that the doctor is too busy to see you	81	1.40
Distance to GP's surgery	80	1.19
Availability of public transport	79	0.73
The time of year	78	0.65
Embarrassment about friends/neighbours knowing that you are ill	82	0.28

6.3.4 Improvements to health care service provision: benefits to respondents

A single item, divided into nine parts, was used to ask respondents to rate how beneficial certain potential health care service provision improvements would be to them. Respondents were presented with a list of nine health care service improvements and asked to indicate on a scale of zero to three the benefit of each, where zero indicated "no benefit", one was "slightly beneficial", two was "moderately beneficial",

and three was "very beneficial". The mean scores for each factor were calculated for both principal farmers and farmers' spouses and presented in order of importance (highest scores/most important first) (Table 6.18).

Once again the scores and ranking for principal farmers and farmers' spouses were very similar (Table 6.18). Both indicated that not having to make an appointment would be of greatest benefit while longer surgery hours appeared in the top three. Farmers' spouses ranked the availability of GP home visits slightly higher than principal farmers, while principal farmers ranked having a wider range of services available at the GP surgery slightly higher. The lower half rankings are identical for principal farmers and farmers' spouses and confirm that confidentiality, public transport and provision of medical information through the internet are viewed as having relatively little benefit.

Table 6.18 Mean scores indicating the relative benefit to respondents of potential improvements to health care service provision. n, number of respondents.

	n	Mean score
Principal farmers		
No need to make an appointment	109	2.06
Longer GP surgery opening hours	110	1.82
Wider range of services available at your GP's surgery	108	1.67
GP home visits more readily available	110	1.66
Improved availability of medical information by telephone	110	1.44
Availability of mobile health services	108	1.01
Greater confidentiality	110	0.84
Improved public transport	108	0.76
Improved availability of medical information through the internet	109	0.67
Farmers' spouses		
No need to make an appointment	81	2.20
GP home visits more readily available	83	1.88
Longer GP surgery opening hours	83	1.77
Wider range of services available at your GP's surgery	83	1.61
Improved availability of medical information by telephone	82	1.56
Availability of mobile health services	82	1.37
Greater confidentiality	81	1.01
Improved public transport	79	0.84
Improved availability of medical information through the internet	82	0.74

6.4   Discussion

Incidence rates for heart problems, cancer, back pain, diabetes, and varicose veins among males and females were broadly similar to those found in the general population (Figure 6.1). However, the incidence of respiratory illness and mental illness among the survey sample was lower than that for the general population for both males and females. The low incidence of mental illness was confirmed by the earlier findings of Chapter 3. SF-36 mental (MCS) health summary scores for survey respondents were generally no worse than would be expected in the general population and for some age groups they were higher (indicating better mental health).

The high rate of accidents among farmers is well documented in official statistics (National Statistics, 2001). It was therefore not surprising to see a relatively large number of farm accidents reported in the survey, suggesting that farm safety in Wales remains a cause for concern (Figure 6.2b). Five percent of principal farmers aged 25-64 had required treatment for factures/breaks in the previous three months, compared to two percent of males of equivalent age that responded to the 1998 Welsh Health Survey (Table 6.5). Nevertheless, the proportion of survey respondents that had visited a hospital accident and emergency unit was lower for each gender and age group compared to the general population (Table 6.15).

Regression analysis suggests that respondents with the poorest health contacted their doctor more frequently. Distance to the doctor's surgery did not affect the mean number of contacts that respondents had with their doctor and contrary to some previous studies there was no evidence of "distance decay", where health service utilisation falls with increasing distance from service provision (Watt et al., 1994). In the case of farming families in the survey sample there are two main reasons why the observation of distance decay would not be expected. Firstly, the nature of farming means that most farming families are likely to have access to their own transport and would not have to rely on public transport. This is confirmed in the section relating to possible barriers to seeking medical treatment, where the availability of public transport was not rated as very important by respondents. Secondly, the mean household distance to the doctor's surgery was only 5.9 miles and the maximum reported distance was sixteen miles; therefore, journey times in a vehicle would be relatively short.

Despite the incidence rates for most illnesses being similar, a substantially higher proportion of respondents to the Farm Family Health Project survey respondents had

not seen their doctor in the past twelve months compared to the general population (Table 6.6). It is unclear as to why this should be the case. Haynes and Bentham (1982) found that for those with long-standing illness, GP consultation rates were lower for rural residents compared to urban residents. While Haynes and Bentham (1982) ruled out physical accessibility as being a factor, establishing the reasons as to why urban residents consulted their GPs more frequently was beyond the scope of their study. In the current study, part of the difference may be attributable to the lower incidence of certain conditions, such as respiratory and mental illnesses, among survey respondents. Similarly, it may be a reflection of the slightly better than average physical health enjoyed by the survey sample compared to the general population. The mean SF-36 physical (PCS) health summary scores for survey respondents recorded in Chapter 3 were higher than those for the general population (Table 3.22).

However, a lower rate of contact with the family doctor for equivalent rates of illness may suggest that farmers are an under served population group in Wales. Both principal farmers and farmers' spouses highlighted surgery opening hours as the most significant issue in determining whether they sought medical advice/treatment (Tables 6.17). Similarly, not having to make an appointment to see the doctor, along with longer surgery opening hours were the improvements that were seen as being the most beneficial (Table 6.18). It is also interesting to note that the present survey was conducted before new arrangements came into force for the provision of GP services in the UK. The 'new GP contract' removed the previous obligation for doctors to provide twenty-four hour patient care and gave them greater flexibility in the delivery of health care services (BMA, 2004). It would seem unlikely that the situation has improved. Indeed, a spate of recent media articles suggests that the issue of GP surgery hours is one of concern to the general public as a whole (Hall, 2005; Hope, 2005).

Given that their workload was the second most important issue to principal farmers with regard to seeking medical advice/treatment (Table 6.17), it is possible that some principal farmers postpone going to the doctor with medical complaints and/or do not have routine medical check-ups. While there was no direct evidence from the present study in Wales, a nurse-practitioner led outreach project in the north west of England uncovered considerable health care needs among farmers (Burnett and Mort, 2001). The project covered South Lakeland and North Lancashire using a specially equipped vehicle to target members of the farming community through attending auction marts and agricultural shows, as well as visiting farmers on their farms. It

found that 42% of those attending check-ups had significant health problems that had not previously been diagnosed (Burnett and Mort, 2001). However, the provision of mobile health services was not ranked as being very beneficial by respondents to the Farm Family Health Project (Table 6.18).

Interestingly, embarrassment about neighbours and friends knowing that they were ill was not an important issue for either principal farmers or farmers' spouses. This suggests that among the survey sample there was no problem with being seen by neighbours/friends at the doctor's surgery. There was only a modest level of awareness of NHS Direct and a low level of usage reported in the survey. Use of the internet for seeking information on medical matters was low and the provision of more information in this manner was not a priority for the study sample.

6.5   Conclusion

Farm families in the survey sample were generally no worse in terms of illness than the general population. However, the utilisation of primary and secondary health care services was lower for survey respondents than for comparable socio-demographic (age, gender) groups in the general population. This suggests that there might be latent demand for health care services from farmers and farmers' spouses. The study has shown that farming families regard the opening hours of GP surgeries as an important issue with regard to accessing health care services. The long hours and irregular work patterns mean that it may be difficult for them to visit the doctor's surgery in normal business hours. While the increased use of technology may offer the prospect of addressing some aspects of rural health care (for example, improved information/advice), evidence from the survey sample suggests that it might not be effective for farm families. However, the provision of a "competitive and sustainable broadband infrastructure across Wales by March 2007," through the Broadband Wales Programme, may change this situation (NAfW, 2004).

Chapter 7: How is farmer health related to the financial status of farming? Findings from a survey of farming families in Wales

How is farmer health related to the financial status of farming? Findings from a survey of farming families in Wales

7.0   Abstract

A survey was conducted during 2002 to investigate the physical and mental health of farmers and their spouses/partners. The main aim of the survey was to investigate whether the health of farming families in Wales was related to the financial status of their farm. With the assistance of the Farm Business Survey in Wales, health questionnaires were delivered to 325 farm households throughout Wales. Usable questionnaires were returned by 195 respondents, representing 125 farms (response rate of 38%).

This chapter uses the thirty-six itemed QualityMetric Short Form health questionnaire instrument, known as SF-36, and farm data supplied by the Farm Business Survey in Wales to test the following null hypotheses:

1.   The physical and mental health of farming families is not related to farm generated incomes.

2.   The physical and mental health of farming families is not related to changes in farm generated incomes.

3.   The physical and mental health of farmers is not related to their net worth.

4.   The physical and mental health of farmers is not related to changes in their net worth.

The main findings are that the four hypotheses cannot be rejected on the evidence of the current study. Nevertheless, with regard to farmer mental health there appears to be an income/mental health effect at very low levels of farm generated income. This merits further research, which should include a qualitative component to assess how farmers perceive their income position. This would confirm the most appropriate farm income measure to adopt or develop.

7.1 Introduction

In poor countries where subsistence agriculture is prevalent, farm output, farm income, and farm family health would appear to be inextricably connected (see diagram in Norton and Alwang, 1993: p.30; Croppenstedt and Muller, 2000). Farm output can be used to provide nutrition for the farming family either directly or through income generation that allows food to be purchased. Maintaining an adequate level of nutrition is a prerequisite to maintaining good health. Conversely, health and nutrition are linked to agricultural productivity and income generation (Cropperenstedt and Muller, 2000): poor health through inadequate nutrition will adversely affect an individual's ability to work effectively. In addition, few poor countries have a free healthcare system and usually patients must pay in order to receive treatment. For farming families in poor countries an inadequate income may therefore become a life and death issue.

Farmers and their families in rich countries, such as the UK, are in a very different situation. The widespread availability of food, access to a social welfare system and universal coverage under a public health care system, means that any connection between the level of farm incomes and the physical health of farming families is likely to be much less pronounced. However, events in recent years such as the foot and mouth disease (FMD) epidemic of 2001 focused attention on the mental health of farmers in the UK. The effects of the FMD crisis on farming families were highlighted in the media and farmer suicides associated with the outbreak were reported in the press (Batty, 2001; Brown and Hetherington, 2001, Carter, 2001; Lomax, 2001). This stimulated the formation of the Rural Stress Action Plan Working Group to initiate a series of Rural Stress Action Plans in England through the Department for Environment, Food and Rural Affairs (DEFRA).

Nevertheless, relatively few studies in the UK have looked at farmer health and most of them predate the FMD crisis. Studies have tended to concentrate on the causes of stress to farmers (McGregor *et al.*, 1995; Boulanger *et al.*, 1999a) and the relatively high suicide rate found among farmers (Hawton *et al.*, 1998; Thomas *et al.*, 2003). While McGregor *et al.* (1995) and Boulanger *et al.* (1999a) established that financial concerns were relatively high in the list of stressors experienced by farmers, no UK study has specifically measured farmer health and collected farm financial data. The collection of such data was a key aim of this study.

The late 1990s was a period in which farmers in the UK experienced a dramatic reduction in incomes. The average net farm income per farm, for all farms in the UK

(excluding horticulture), fell by around 85% in real terms between 1995/1996 and 1999/2000 (Figure 7.1). The trend for average net farm incomes in Wales for 1993/1994 to 2001/2002 was similar to that for the UK overall (Figure 7.1). Welsh dairy farms and livestock farms in the Less Favoured Areas (LFAs) of Wales have had slightly higher average net farm incomes since 1995/1996 than the average for all UK farms. Lowland cattle and sheep farms in Wales generally fared less well (Figure 7.1).

Figure 7.1. Index of average net farm income per farm in real terms for all UK farms (excluding horticulture) and selected farm types in Wales, for the period 1993/1994 to 2001/2002.
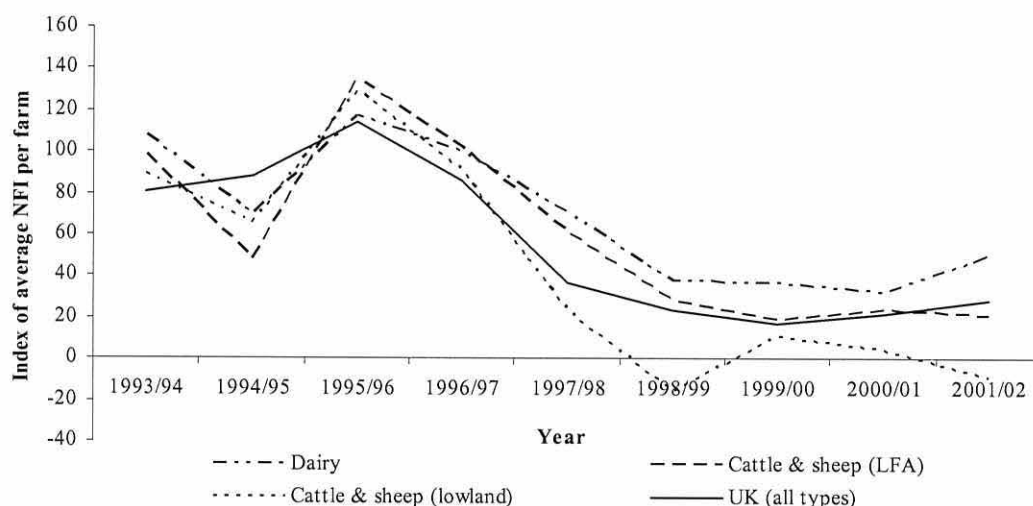
Figure notes
Index of average net farm income per farm uses indices based on 1994/95 to 1996/97 = 100, adjusted using GDP deflator to 1993/94 prices. Sources: DEFRA, 2001; HM Treasury, 2005.
Figures for 2001/02 are provisional.
NFI: Net farm income.
LFA: Less Favoured Area.

This chapter seeks to ascertain whether there is any relationship between the financial status of farms and the health of farmers and farmers' spouses. It uses data collected from the health survey outlined in Chapter 3 and information provided by the Farm Business Survey in Wales. More specifically, this chapter aims to test the following null hypotheses:

1. The physical and mental health of farming families is not related to farm generated incomes.

2. The physical and mental health of farming families is not related to changes in farm generated incomes.

3. The physical and mental health of farmers is not related to their net worth.

4.   The physical and mental health of farmers is not related to changes in their net worth.

7.2   Methodology

Health survey

A survey was conducted of farm households in Wales during 2002, with the assistance of the Farm Business Survey in Wales. The information sought included: the physical and mental health status of farmers and their spouses; use of health services; barriers to accessing healthcare; background details such as gender, age and marital status. Chapter 3 provides a detailed account of how the health survey was conducted along with the results relating to the socio-demographic details of respondents.

Data supplied by the Farm Business Survey in Wales

The Farm Business in Wales supplied a wide range of financial and non-financial data for individual farms from which at least one completed health questionnaire was received. Financial data included the full range of farm input costs and output revenues used to calculate the different measures of farm income, as well as the value of assets and liabilities used to derive the net worth of the farm business.

Table 7.1.   The cumulative number of farms, from the health survey sample, included in the Farm Business Survey in Wales from 1997/1998 to 2001/2002.

	Cumulative n	Cumulative %
1997/1998	78[a]	69.6
1998/1999	87	77.7
1999/2000	96[b]	85.7
2000/2001	105	93.8
2001/2002	112	100.0

Table notes
n: Number of farms.
a: For 5 records, no data were collected for 2000/2001 due to the outbreak of foot and mouth disease.
b: For 1 record, no data were collected for 2000/2001 due to the outbreak of foot and mouth disease.

Non-financial data principally related to: the physical characteristics of the farm such as the area; the physical quantities of certain outputs; codes indicating tenure and farm type. As well as supplying data for the year 2001/2002 (the most recent year, collected during the course of the health survey), data was supplied for the previous four years where available. Each year a proportion of farms leave the Farm Business

Survey in Wales and new farms are recruited to take their place. Out of the 112 farms in the sample, 78 had been in the survey for the entire five year period, while only seven farms were new to the Farm Business Survey in Wales for 2001/2002 (Table 7.1). A small number of farms had no available data for 2000/2001 as collection had not been possible due to the effects of foot and mouth disease.

Foot and mouth disease

The foot and mouth disease (FMD) outbreak that affected parts of Wales occurred during the period to which the farm financial data used in this study relates. The annual report of the Farm Business Survey in Wales for 2001/2002 (UWA, 2003) sets out their treatment of FMD payments. Compensation payments for breeding livestock were divided between income and capital with the estimated market value of the livestock at the time of slaughter forming the income component. The income component for breeding livestock, along with compensation for trading livestock and welfare cull payments were included in net farm income. The Farm Business Survey in Wales state that, "The difference between the actual compensation and the market value [for breeding livestock] was assigned as capital, recorded as an 'exceptional item' and excluded from Net Farm Income" (UWA, 2003). The farm financial data analysed for the purposes of this study excluded all of these FMD exceptional items/payments. Due to FMD caution should be exercised in interpreting the farm financial data for 2000/2001 (UWA, 2003).

7.3   Results

7.3.1   Analysis of the farm data

Farm type

The primary determinant of farm type is, "the proportion of the standard gross margin (SGM) total accounted for by each enterprise" (UWA, 2002). Standard gross margins for different enterprises are derived from gross margins (enterprise output less variable costs for that enterprise) that have been calculated for the major crop and livestock enterprises in Wales to give 'standards' or 'norms'. The standard gross margin total can be calculated for a farm and the proportion attributable to each enterprise determined.

Table 7.2. Characteristics of farm types by Less Favoured Area (LFA) designation and farm enterprise. DA, Disadvantaged Area; SDA, Severely Disadvantaged Area. Source: UWA, 2003.

	Characteristics	
	Less Favoured Area	Enterprise
Dairy (LFA)	Over 50% of farm in LFA (SDA or DA)	Dairy cows contribute more than two thirds of total SGM
Lowland dairy	Less than 50% of farm in LFA (SDA or DA)	Dairy cows contribute more than two thirds of total SGM
Specialist sheep (SDA)	Over 50% of farm in SDA	Sheep contribute more than two thirds of total SGM
Specialist beef (SDA)	Over 50% of farm in SDA	Non-dairy cattle contribute more than two thirds of total SGM
Mixed cattle and sheep (SDA)	Over 50% of farm in SDA	Non-dairy cattle and sheep contribute more than two thirds of total SGM
Cattle and sheep (DA)	Over 50% of farm in DA	Non-dairy cattle and sheep contribute more than two thirds of total SGM
Lowland cattle and sheep	Less than 50% of farm in LFA (SDA or DA)	Non-dairy cattle and sheep contribute more than two thirds of total SGM

A further component of farm type is the proportion of the farm area that falls within the Less Favoured Areas. This European Community land designation allows extra support to be made available to farmers due to the difficult agricultural conditions (poor climate, fertility, and topography). In Wales LFAs extend to include around 79% of land and are subdivided into Severely Disadvantaged Areas (SDAs) and Disadvantaged Areas (DAs) (NAfW, 2003a). To be classified as 'LFA' farms must have 50% or more of their land within the LFA boundary. Similarly, farms with more than 50% of their land in the Severely Disadvantaged Area are classed as 'SDA' and those with most of their land within Disadvantaged Area are classed as 'DA'.

The Less Favoured Area and enterprise characteristics of the main farm types found in Wales are summarised in Table 7.2. While there are currently 27 main types of farm used in the UK Farm Classification System (Defra, 2002), only seven are found in the sample of farms considered here (Table 7.3). Five of these are associated with agricultural land in the Less Favoured Areas (LFAs) of Wales representing 80.4% of farms in the sample. The largest group of farms in the sample, with over a quarter of the total (25.9%), is classed as specialist sheep within the SDA. Mixed cattle and sheep

farms in the severely disadvantaged and disadvantaged areas each account for around 17% of farms in the sample, while most of the remaining farms were dairy farms.

Actual farm area

In terms of the actual farm area 42% of the farms in the survey sample had an area between 51 and 100 hectares (Table 7.3). The second largest group comprises those farms between 101 and 151 hectares representing around 20% of farms. Farms in the smallest area group of farms up to 50 hectares represent a similar proportion (around 12%) to those in the largest category (area over 250 hectares).

Effective farm area

The effective farm area adjusts the actual farm area to allow for the area taken by buildings, roads, woods, and wasteland, while adjusting the area of rough grazing to an equivalent in terms of permanent pasture (UWA, 2002). A further adjustment is made for any areas of common grazing that is used. There is a considerable reduction in the number of farms in the highest category (251+ hectares) when the measure of effective hectares is used instead of actual hectares (Table 7.3).

Size of the farm business

The size of the farm business is expressed by the Farm Business Survey in Wales in terms of European Size Units (ESUs) (UWA, 2002). These are derived by summing the standard gross margins for each individual enterprise on a farm and expressing them in European Currency Units. One thousand two hundred ECUs are equivalent to one ESU (UWA, 2002). Over 40% of the farms in the survey were in the range between 40 and 99.9 ESUs, with a further third in the range 16 to 39.9 ESUs (Table 7.3). The remaining farms were mainly split between the 8 to 15.9 ESU range (8.9%) and the 100 and 199.9 ESUs range (11.6%), with just two farms registering over 200 ESUs.

Farm tenure

Seventy-one farms (63.4%) in the study were wholly owner-occupied, nine (8.0%) were wholly tenanted and 32 (28.6%) had mixed tenure (Table 7.3). Of the farms with mixed tenure 25 (22.3%) rented less than fifty percent of their actual farm area and seven (6.3%) rented over fifty percent of their actual farm area.

Table 7.3. Frequency distribution of sample farms by farm type, actual area (hectares), effective area (hectares), and farm business size group (ESUs).

	n	%
Farm type		
Dairy (LFA)	15	13.4
Lowland dairy	15	13.4
Specialist sheep (SDA)	29	25.9
Specialist beef (SDA)	7	6.3
Mixed cattle and sheep (SDA)	20	17.9
Cattle and sheep (DA)	19	17.0
Lowland cattle and sheep	7	6.3
Actual farm area (hectares)		
1 to 50	15	13.4
51 to 100	47	42.0
101 to 150	23	20.5
151 to 200	9	8.0
201 to 250	5	4.5
251+	13	11.6
Effective farm area (hectares)		
1 to 50	18	16.1
51 to 100	49	43.8
101 to 150	23	20.5
151 to 200	11	9.8
201 to 250	5	4.5
251+	6	5.4
Size of the farm business (European Size Units)		
Under 7 ESUs	0	0.0
8 to 15.9 ESUs	10	8.9
16 to 27.9 ESUs	19	17.0
28 to 39.9 ESUs	19	17.0
40 to 59.9 ESUs	24	21.4
60 to 99.9 ESUs	25	22.3
100 to 199.9 ESUs	13	11.6
Over 200 ESUs	2	1.8
Farm tenure		
Owned (100%)	71	63.4
Tenanted (100%)	9	8.0
Mixed tenure	32	28.6
Foot and mouth disease (FMD) compensation		
FMD payments received	39	34.8
FMD payments not received	73	65.2

Table notes
Percentages may not sum to 100 due to rounding.
n: Number of respondents.
ESU: European Size Unit.
LFA: Less Favoured Area.
SDA: Severely Disadvantaged Area.
DA: Disadvantaged Area.

Foot and mouth disease compensation payments

Over one-third of farms (34.8%) in the study received a compensation payment related to the outbreak of foot and mouth disease (Table 7.3).

Farm income

There has been considerable debate among agricultural economists as to how farm income should be measured (Hill, 1982). The data supplied by the Farm Business Survey in Wales included four farm income measures: net farm income, occupier's net income, cash income, and management and investment income. Each of these is briefly considered in turn below.

Net farm income is, "...total farm enterprise output less total inputs (excluding the value of the labour of the farmer and spouse)" (UWA, 2002). To allow comparisons between farms with different tenures, it treats all farms as tenanted and, "represents the return to the farmer and spouse for their labour and management, and on the tenant-type capital of the business" (UWA, 2002). Tenant-type assets such as crops, machinery, and livestock are assumed to be owned by the occupier and, "an imputed labour cost is deducted for unpaid family labour (other than the farmer and spouse)" (DEFRA, 2001).

Occupier's net income shows, "...the return to the farmers and spouse for their manual and managerial labour and on all their capital invested in the business" (DEFRA, 2001). An important difference to net farm income is that it will be affected by the actual tenure of the farm, which reduces its usefulness in making income comparisons between farms where tenure varies; landlord type costs and interest payments, net of interest received, are included as input costs and imputed rent is not deducted. Nevertheless, occupier's net income is, "...closer to the income position as perceived by the occupier in that it more closely represents actual financial transactions carried out" (DEFRA, 2001).

Cash income is defined as, "...the cash return to the group with an entrepreneurial interest in the business for their manual and managerial labour and on all their investment in the business" (DEFRA, 2001) and is based on actual receipts and expenditures (UWA, 2002). It can be calculated from occupier's net income by subtracting valuation changes in crops and livestock while adding the depreciation of fixed assets and imputed labour costs.

The final income measure included was management and investment income, defined as, "...the return to the farmer and spouse for their management and on the tenant-type capital of the business" (DEFRA, 2001). It is calculated from net farm income by deducting an imputed cost for the manual labour of the farmer and spouse.

While each of the different income measures has advantages and disadvantages, none is completely satisfactory. Net farm income has been referred to as a hybrid measure for its inconsistent use of imputed figures (Bright, 1996), though in the present context it allows farms of different tenures to be compared on a common basis. While occupier's net income is officially recognised as being closer to the perceived income position of the farmer net farm income (DEFRA, 2001), it may not be as close as cash income which eliminates all imputed charges. Management and investment income would appear to have little to commend it since it is calculated from net farm income using a further set of imputed charges.

The perception that a farmer has regarding his income position may be as important in determining his level of well being as the actual farm income calculated using official measures. The level of sales made by the farmer could, for example, lead to a greater feeling of well being due to there being "cash in his pocket", even though the sales may have been unprofitable. It is not immediately apparent which measure should be used (Hill, 1982). For this reason net farm income, occupier's net income (excluding breeding livestock appreciation), and cash income were all used in this analysis.

Farm incomes in the study

There were a large range of farm incomes for each of the three alternative measures used amongst survey respondents (Table 7.4). The mean cash income of £35,328, with no imputed items, is over twice that for mean net farm income (Table 7.4). For each of the income measures the differences between the quartile means were substantial and was statistically significantly different (p<0.001). Farms in the lowest quartile had a mean cash income of less than £30 per week, compared to over £1,600 for those in the highest.

Figure 7.2 shows the frequency distribution of net farm income, occupier's net income and cash income among farms in the survey using income bands. Negative net farm incomes were recorded for 33 farms (29.6%) in 2001/2002, while in contrast net farm incomes exceeded £30,000 for 27 farms (21.4%) (Figure 7.2). For occupier's net

income, which uses actual farm tenure and indebtedness, it was not surprising to see that the number of farms recording a negative income fell to 24 (21.5%) (Figure 7.2). Similarly, for cash income, which does not include any imputed amounts, only 11 farms (9.9%) recorded a negative income and almost half (45.5%) recorded a cash income that exceeded £30,000 for 2001/2002 (Figure 7.2).

Table 7.4. Selected summary statistics for different measures of farm income for sample farms (n = 112) for 2001/2002. BLSA, Breeding Livestock Appreciation.

Summary statistics	Net farm income (excl. BLSA) (£)	Occupier's net income (£)	Cash income (£)
Minimum	-34,320	-34,140	-28,482
Maximum	289,393	252,557	295,948
Range	323,713	286,697	324,430
Mean	16,413	18,078	35,328
Standard error of the mean	3,456	3,201	3,848
Median	8,837	10,392	27,738
Quartile 1 mean	-12,452	-9,387	1,438
Quartile 2 mean	3,266	5,555	18,794
Quartile 3 mean	15,979	17,749	35,917
Quartile 4 mean	58,860	58,393	85,162

Figure 7.2. Frequency distributions for net farm income, occupier's net income, and cash income for all farms in the survey sample (n = 112) for the year 2001/2002.
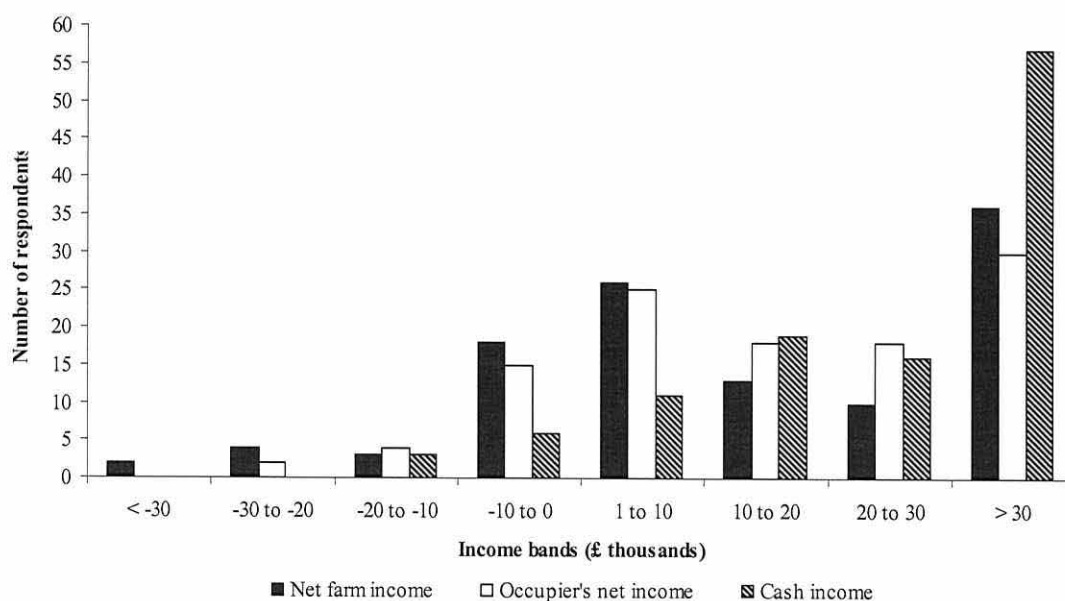
Farm incomes were also examined by farm type (Table 7.5). Lowland dairy farms show the highest mean income figures across all income measures in contrast to specialist sheep farms in the Severely Disadvantaged Areas (SDAs) which have the lowest mean incomes as measured by net farm income and occupier's net income and the second lowest mean cash income (Table 7.5). For each of the three measures of farm income differences between farm types were statistically significant (Kruskal-Wallis: $p<0.001$). The relatively high standard errors across all income measures for all farm types indicated a high degree of variance of incomes within farm types.

The farm financial data supplied by the Farm Business Survey in Wales allowed a comparison of income trends with a wider sample of farms in Wales for the period 1997/1998 to 2001/2002 (Figure 7.3). Although 78 farms in the sample had been in the Farm Business Survey for the whole five year period (see Table 7.1), ten farms were removed for the purposes of this comparison. Farms were removed for three reasons: income data was missing for 2000/2001 due to FMD (5 farms); the farm type had changed significantly during the period (3 farms); farms classed as lowland cattle and sheep (2 farms). In terms of net farm income per farm dairy farms in the health survey have generally faired worse than farms in Wales as a whole, while cattle and sheep farms have faired better than the average for Wales.

Table 7.5. Net farm income, occupier's net income, and cash income for different farm types in the survey sample for the year 2001/2002.

	n	Net farm income (excl. BLSA) £	s.e.	Occupier's net income £	s.e.	Cash income £	s.e.
Farm type							
Dairy (LFA)	15	23,933	5,320	17,595	5,570	35,608	8,195
Lowland dairy	15	60,243	17,632	58,229	15,286	77,962	16,714
Specialist sheep (SDA)	29	-1,069	3,048	3,398	2,794	18,998	3,570
Specialist beef (SDA)	7	22,816	8,788	21,796	8,739	42,297	12,255
Mixed cattle and sheep	20	13,575	4,742	16,856	4,487	39,188	7,607
Cattle and sheep (DA)	19	8,056	6,845	8,056	6,845	26,861	9,643
Lowland cattle and sheep	7	3,187	2,863	16,413	3,456	16,001	5,550
		Statistic	Sig	Statistic	Sig	Statistic	Sig
K-W Test (Asymp Sig)		p<0.001	Yes	p<0.001	Yes	p<0.001	Yes

Table notes
s.e.: Standard error of the mean.
n: Number of respondents.
BLSA: Breeding Livestock Appreciation.
LFA: Less Favoured Area.
SDA: Severely Disadvantaged Area.
DA: Disadvantaged Area.
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether the test result indicated statistically significant difference between incomes for different farm types. 'Yes' indicates p<0.01.

Figure 7.3. A comparison between average net farm income (£ per farm at current prices) for selected farm types in Wales from official data, with that collated for the Farm Family Health Project (FFHP) for the years 1997/98 to 2001/02.
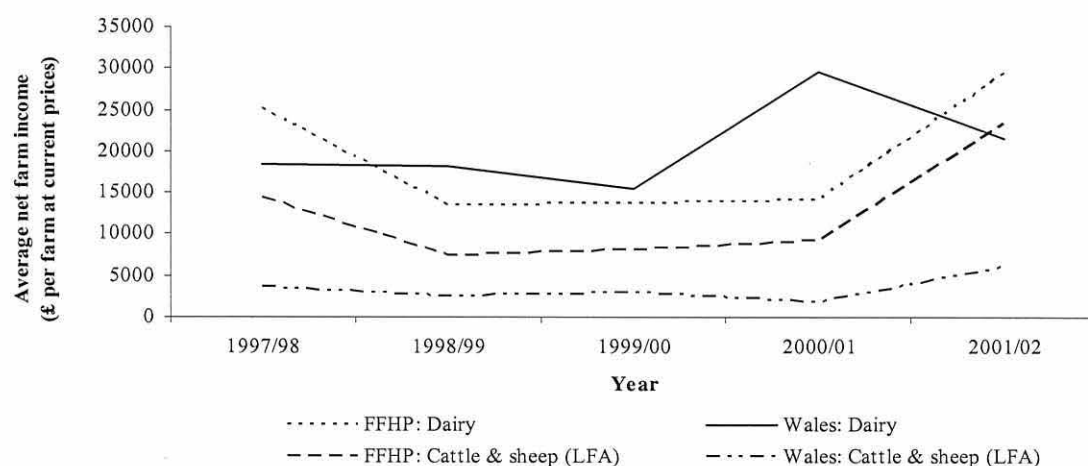
Figure notes
Figures for Wales, source: DEFRA, 2002.
Figures for Wales 2001/02 are provisional.
Figures for Wales in 2001/02 exclude farms subjected to compulsory foot and mouth cull.
FFHP: Farm Family Health Project. FFHP dairy farms n = 16, FFHP cattle and sheep (LFA) farms n = 42.
LFA: Less Favoured Area.

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7.3.2 Analysis of SF-36 scores for farmers with respect to farm variables

Farm type

The mean SF-36 physical (PCS) health summary scores for farmers by farm type vary from 48.01 for those with SDA mixed cattle and sheep farms to 55.54 for SDA specialist beef farms (Table 7.8). There does not appear to any discernible pattern to PCS scores in terms of whether farms are in the Less Favoured Areas (LFAs) or by livestock type. Results from a Kruskal-Wallis test show that differences in PCS scores for farmers with different types of farm were not statistically significant (Table 7.9).

SF-36 mental (MCS) health summary scores range from 47.04 for farmers with LFA dairy farms to 53.57 for those with lowland dairy farms (Table 7.8). This is a potentially interesting result since among the different farm types in the survey lowland dairy farms had the highest mean farm incomes (Table 7.5). To investigate this further the mean income figures for each farm type were ranked from one (highest) to seven (lowest) along with the mean SF-36 MCS scores for farmers from the different farm types (Table 7.6).

Table 7.6. Rankings for different farm income measures and mean SF-36 mental (MCS) health summary scores for farmers in the survey sample.

Farm type	Ranking (1 = highest)			
	NFI	OccNI	Cash	MCS
Dairy (LFA)	2	3	4	7
Lowland dairy	1	1	1	1
Specialist sheep (SDA)	7	7	6	3
Specialist beef (SDA)	3	2	2	2
Mixed cattle and sheep (SDA)	4	4	3	5
Cattle and sheep (DA)	5	6	5	6
Lowland cattle and sheep	6	5	7	4

Table notes
LFA: Less Favoured Area.
SDA: Severely Disadvantaged Area.
DA: Disadvantaged Area.
MCS: Mental Component Score. This is the SF-36 summary measure that indicates the mental health of respondents.
NFI: Net Farm Income (excluding Breeding Livestock Appreciation).
OccNI: Occupier's Net Income.
Cash: Cash Income.

Examination of the rankings indicates that occupier's net income was the income measure most similar to the ranking of the MCS scores (Table 7.6). Positions one, two, and six are identical with positions four and five reversed; ranks three and seven are also reversed (Table 7.6). Nevertheless, the result of a Kruskal-Wallis test indicates

that the differences in MCS scores for farmers from different farm types were not significantly different (Table 7.9).

Farm area

Mean SF-36 physical (PCS) and mental (MCS) health summary scores were examined for farmers using the actual and effective farm area quartiles (Table 7.8). They showed very little variation for either actual or effective areas when presented by quartiles and differences in scores were not significantly different (Tables 7.8 and 7.9).

The correlation between farm area and farm generated income would generally expected to be positive. However, the strength of this correlation will be determined by the mix of enterprises on farms. For the survey sample, actual and effective farm areas were significantly positively correlated to cash income, though not to net farm income or occupier's net income (Figure 7.7).

Table 7.7 Spearman's rho correlation coefficients for actual and effective farm area (hectares), net farm income, occupier's net income, and cash income. BLSA, Breeding Livestock Appreciation; ** significant at the 0.01 level (2-tailed); * significant at the 0.05 level (2-tailed).

	Actual farm area (hectares)	Effective farm area (hectares)	Net farm income (excl. BLSA) (£)	Occupier's net income (£)	Cash income (£)
Actual farm area (hectares)	1.000				
Effective farm area (hectares)	0.982**	1.000			
Net farm income (excl. BLSA) (£)	-0.057	-0.042	1.000		
Occupier's net income (£)	-0.004	0.018	0.897**	1.000	
Cash income (£)	0.225*	0.222*	0.743**	0.812**	1.000

Farm business size

The mean SF-36 physical (PCS) health summary scores for farmers by farm business size quartiles ranged from 47.90 to 54.74 (Table 7.8). In contrast, mean SF-36 mental (MCS) health summary scores showed considerably less variation between quartiles, ranging from 50.03 to 51.90 (Table 7.8). The differences in scores were not significantly different for either PCS or MCS scores (Table 7.9).

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Table 7.8. Mean SF-36 physical (PCS) and mental (MCS) health summary scores for principal farmers by farm type, actual farm area quartiles, effective farm area quartiles, farm business size quartiles, tenure, and receipt of foot and mouth disease compensation payments.

	n	%	PCS	s.e.	MCS	s.e.
Farm type						
Dairy (LFA)	15	13.4	53.64	1.36	47.04	2.82
Lowland dairy	15	13.4	51.52	2.06	53.57	1.36
Specialist sheep (SDA)	29	25.9	49.06	1.74	51.63	1.69
Specialist beef (SDA)	7	6.3	55.54	2.31	52.72	3.14
Mixed cattle and sheep (SDA)	20	17.9	48.01	2.44	50.79	2.40
Cattle and sheep (DA)	19	17.0	53.43	1.67	48.28	2.57
Lowland cattle and sheep	7	6.3	53.63	2.01	51.28	1.51
Dairy (LFA)	0	0	-	-	-	-
Lowland dairy	0	0	-	-	-	-
Farm area (actual ha) by quartiles (1 = smallest)						
Quartile 1	28	25	50.06	1.88	51.21	1.60
Quartile 2	28	25	51.95	1.65	50.61	1.80
Quartile 3	28	25	51.44	1.75	50.76	1.75
Quartile 4	25	25	51.53	1.13	49.83	2.02
Farm area (effective ha) by quartiles (1 = smallest)						
Quartile 1	28	25	51.26	1.75	51.90	1.40
Quartile 2	28	25	49.74	1.92	50.03	1.95
Quartile 3	28	25	51.82	1.63	50.40	1.78
Quartile 4	25	25	52.16	1.06	50.07	1.99
Farm business size (ESUs) by quartiles (1 = smallest)						
Quartile 1	28	25	47.90	2.09	51.45	1.56
Quartile 2	28	25	50.68	1.68	50.08	2.14
Quartile 3	28	25	54.74	1.02	50.65	1.78
Quartile 4	25	25	51.67	1.24	50.24	1.66
Farm tenure						
Owned (100%)	71	63.4	50.29	1.02	52.02	1.07
Tenanted (100%)	9	8.0	55.49	1.52	50.82	2.65
Mixed tenure	32	28.6	52.18	1.58	47.41	0.89
Foot and mouth disease (FMD) compensation payments						
FMD payment received	39	65.2	48.70	1.65	50.53	1.51
FMD payment not received	73	34.8	52.61	0.83	50.64	1.11

Table notes
LFA: Less Favoured Area.
SDA: Severely Disadvantaged Area.
DA: Disadvantaged Area.
ESUs: European Size Units.
PCS: Physical Component Score. This is the SF-36 summary measure that indicates the physical health of respondents.
MCS: Mental Component Score. This is the SF-36 summary measure that indicates the mental health of respondents.
s.e.:   Standard error of the mean.

Table 7.9. Results of statistical tests on mean SF-36 physical (PCS) and mental (MCS) health summary scores for principal farmers by selected farm variables.

Variable/test undertaken	PCS		MCS	
	Statistic	Sig	Statistic	Sig
Farm type				
K-W Test (Asymp Sig)	0.267	No	0.578	No
Area (actual ha) by quartiles				
K-W Test (Asymp Sig)	0.655	No	0.989	No
Area (effective ha) by quartiles				
K-W Test (Asymp Sig)	0.975	No	0.969	No
ESU size groups by quartiles				
K-W Test (Asymp Sig)	0.089	No	0.905	No
Farm tenure				
K-W Test (Asymp Sig)	0.137	No	0.044	Yes*
FMD compensation payments				
M-W Test (Asymp Sig 2-tailed)	0.079	No	0.963	No

Table notes
PCS: Physical Component Score. This is the SF-36 summary measure that indicates the physical health of respondents.
MCS: Mental Component Score. This is the SF-36 summary measure that indicates the mental health of respondents.
M-W Test: Mann-Whitney U Test.
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between SF-36 scores for groups within the variable concerned. 'No' indicates $p > 0.05$.
* Significant at the 0.05 level.

Farm tenure

Differences in mean SF-36 physical (PCS) health summary scores for different farm tenures were not significantly different, while those for MCS were (Tables 7.8 and 7.9). This suggests that farmers with a mixture of tenanted and owned land have poorer mental health than either those renting all their land or those owning it all.

Foot and mouth compensation payments

Differences in mean SF-36 physical (PCS) and mental (MCS) health summary scores between farms that had received FMD compensation payments and those that had not received payments were not significantly different (Tables 7.8 and 7.9).

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7.3.3 Analysis of SF-36 scores for farmers with respect to farm income

Correlations

Spearman's rho correlation coefficients for SF-36 physical (PCS) health summary scores and each of the farm income measures were negative, non-significantly different and extremely small in magnitude (Table 7.10). Correlation coefficients for SF-36 mental (MCS) health summary scores and farm income measures were also small and not significantly different (Table 7.10). The correlation coefficients showed no *prima facie* evidence for a link between farm incomes and either farmer physical or mental health.

Table 7.10. Spearman's rho correlation coefficients for farmers' SF-36 physical (PCS) and mental (MCS) health summary scores, net farm income, occupier's net income, and cash income. BLSA, Breeding Livestock Appreciation; ** significant at the 0.01 level (2-tailed).

	PCS	MCS	Net farm income (excl. BLSA)	Occupier's net income	Cash income
PCS	1.000				
MCS	-0.140	1.000			
Net farm income (excl. BLSA)	-0.002	0.003	1.000		
Occupier's net income	-0.013	-0.065	0.897**	1.000	
Cash income	-0.047	-0.036	0.743**	0.812**	1.000

Farm income quartiles

To further investigate any relationship between the physical and mental health of farmers and farm income, mean PCS and MCS scores were obtained for the income quartiles, using each of the three measures (Table 7.11). Ranges for mean PCS scores were 6.19, 3.48, and 3.80 for net farm income, occupier's net income, and cash income quartiles respectively (Table 7.11). Differences in PCS scores were not significantly different for any of the income measure quartiles (Table 7.12). Mean MCS scores showed considerable variation for net farm income and occupier's net income quartiles with ranges of 7.54 and 6.72 respectively (Table 7.11). For cash income, mean MCS scores varied by only 1.76 across the quartiles (Table 7.11). Differences in MCS scores between quartiles were statistically significant ($p<0.05$) for net farm income and occupier's net income, but not for cash income (Table 7.12). Interestingly, the lowest mean MCS scores were not found among farmers in the lowest mean income quartiles, but consistently across all income measures in quartile 3 (Table 7.11).

Table 7.11. Mean SF-36 physical (PCS) and mental (MCS) health summary scores for principal farmers by net farm income quartiles, occupier's net income quartiles, and cash income quartiles. s.e., standard error of the mean.

	n	%	PCS	s.e.	MCS	s.e.
Net farm income (excl. BLSA)						
Quartile 1	28	25	51.85	1.68	50.82	1.41
Quartile 2	28	25	52.14	1.28	52.92	1.91
Quartile 3	28	25	47.40	1.92	45.57	2.12
Quartile 4	28	25	53.59	1.31	53.11	1.22
Occupier's net income						
Quartile 1	28	25	51.95	1.67	51.53	1.37
Quartile 2	28	25	49.66	1.61	52.75	1.69
Quartile 3	28	25	50.23	1.78	46.03	2.21
Quartile 4	28	25	53.14	1.35	52.11	1.51
Cash income						
Quartile 1	28	25	50.24	1.74	51.29	1.57
Quartile 2	28	25	53.62	1.40	50.38	1.81
Quartile 3	28	25	51.30	1.70	49.53	1.91
Quartile 4	28	25	49.82	1.57	51.22	1.86

Table 7.12. Results of statistical tests on mean SF-36 physical (PCS) and mental (MCS) health summary scores for principal farmers by net farm income quartiles, occupier's net income quartiles, and cash income quartiles.

Variable/test undertaken	PCS		MCS	
	Statistic	Sig	Statistic	Sig
Net farm income quartiles				
K-W Test (Asymp Sig)	0.075	No	0.018	Yes*
Occupier's net income quartiles				
K-W Test (Asymp Sig)	0.304	No	0.043	Yes*
Cash income quartiles				
K-W Test (Asymp Sig)	0.287	No	0.849	No

Table notes
K-W Test: Kruskal-Wallis Test.
Sig: Shows whether test result indicated statistically significant difference between SF-36 scores for groups within the variable concerned. 'No' indicates $p > 0.05$.
* Significant at the 0.05 level.

Scatter diagrams

To further investigate the relationship between farmers' mental health scores and the different farm income measures a series of scatter diagrams were plotted (Figures 7.4, 7.6, 7.8). The plotted trend lines on each diagram showed a small positive slope, although the R^2 values were very low (Figures 7.4, 7.6, 7.8). For each of the plots there

were a comparatively small number of very large incomes. To assess the impact of these on the results, SPSS software was used to iteratively remove the outlying income figures using box plots. For example, with net farm income an initial box plot indicated one extreme income figure and four further outliers. These were identified in the dataset, removed, and the box plot run again. The outliers were again identified, removed and the process repeated until no further outliers were indicated. The process was repeated for all three income measures.

Farm income measures were once again plotted against farmer' MCS scores (Figures 7.5, 7.7, 7.9). The gradient of the trend line for net farm income was reduced to almost horizontal at 50 on the MCS scale, while for both occupier's net income and cash income the trend line became downward sloping (Figures 7.5, 7.7, 7.9). This suggests that there may be a positive income effect on mental at higher levels of income.

To examine the relationship in further detail the original 112 farms were plotted on scatter diagrams by income quartiles with trend lines included for each quartile (Figures 7.10, 7.11, 7.12). The trend lines differed substantially only in the second quartile: the slope was positive for net farm income and negative for occupier's net income and cash income. The R^2 was generally very low for each trend line: those for cash income quartiles were generally higher than those for the equivalent quartiles for net farm income or occupier's net income (Figures 7.10, 7.11, 7.12). The exception was for the first quartile of occupier's net income (Figures 7.10, 7.11, 7.12).

The effect of off-farm employment

Chapter 3 reported that overall 19% of survey respondents had off-farm jobs (principal farmers: 12.5%; farmers' spouses: 27.7%). Having an additional source of income that is derived away from the farm may reduce the effect that farm generated income has on the mental health of farmers. This section aims to investigate whether the above results are altered by the presence or absence of off-farm employment in the farm household.

Examination of the data revealed that among the 112 principal farmers, 52 lived in a household where there was no off-farm employment and 28 lived in a household where the principal farmer and/or spouse had off-farm employment. For the remaining 32 principal farmers it was impossible to establish whether there was any off-farm employment undertaken by their spouse (no questionnaire had been completed). This latter group was therefore removed from the analysis in Figures 7.13 and 7.14.

Figure 7.4. Net farm income 2001/2002 plotted against SF-36 mental (MCS) health summary scores for farmers in the survey sample (n =112) with trend line. BLSA, Breeding Livestock Appreciation.

Figure 7.5. Net farm income 2001/2002 plotted against SF-36 mental (MCS) health summary scores for farmers in the survey sample (n = 102) with trend line, where income outliers have been removed. BLSA, Breeding Livestock Appreciation.

Figure 7.6. Occupier's net income 2001/2002 plotted against SF-36 mental (MCS) health summary scores for farmers in the survey sample (n =112) with trend line.

Figure 7.7. Occupier's net income 2001/2002 plotted against SF-36 mental (MCS) health summary scores for farmers in the survey sample (n = 104) with trend line, where income outliers have been removed.

Figure 7.8. Cash income 2001/2002 plotted against SF-36 mental (MCS) health summary scores for farmers in the survey sample (n =112) with trend line.
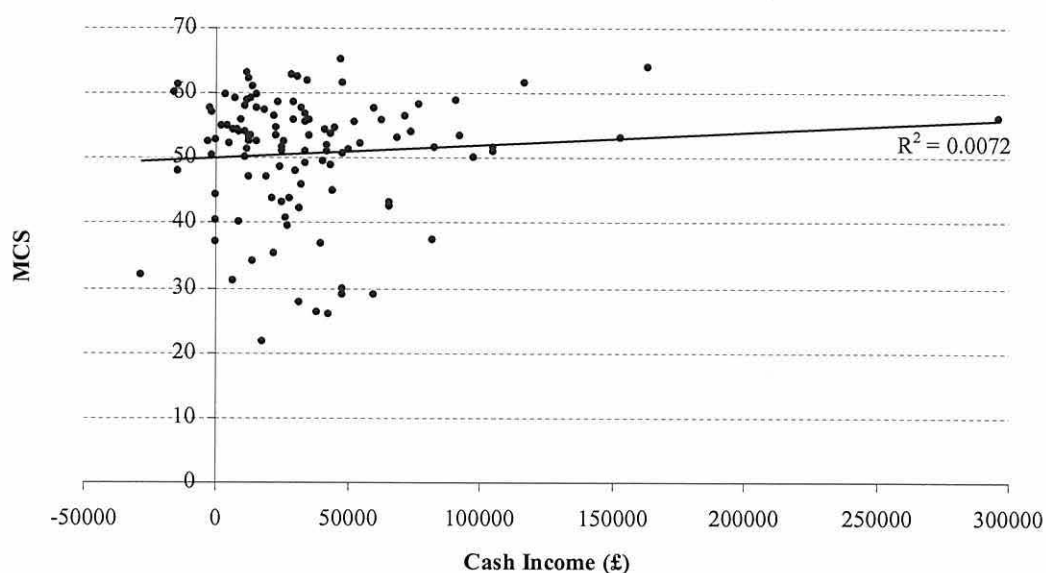
Figure 7.9. Cash income 2001/2002 plotted against SF-36 mental (MCS) health summary scores for farmers in the survey sample (n = 103) with trend line, where income outliers have been removed.
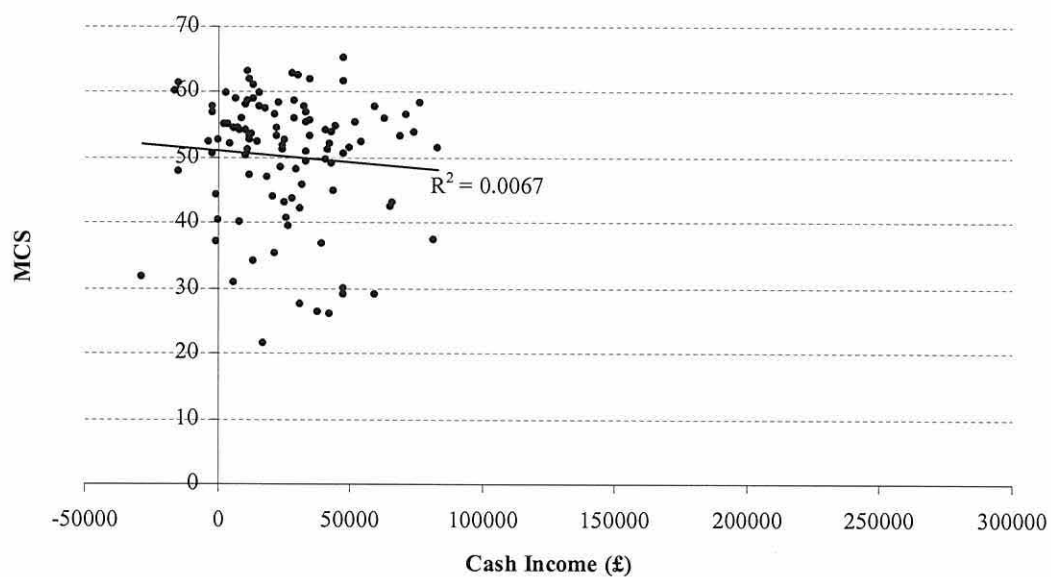
Figure 7.10. Net farm income 2001/2002 plotted against SF-36 mental (MCS) health summary scores for farmers in the survey sample (n = 112) with trend lines for each net farm income quartile plotted separately. BLSA, Breeding Livestock Appreciation.
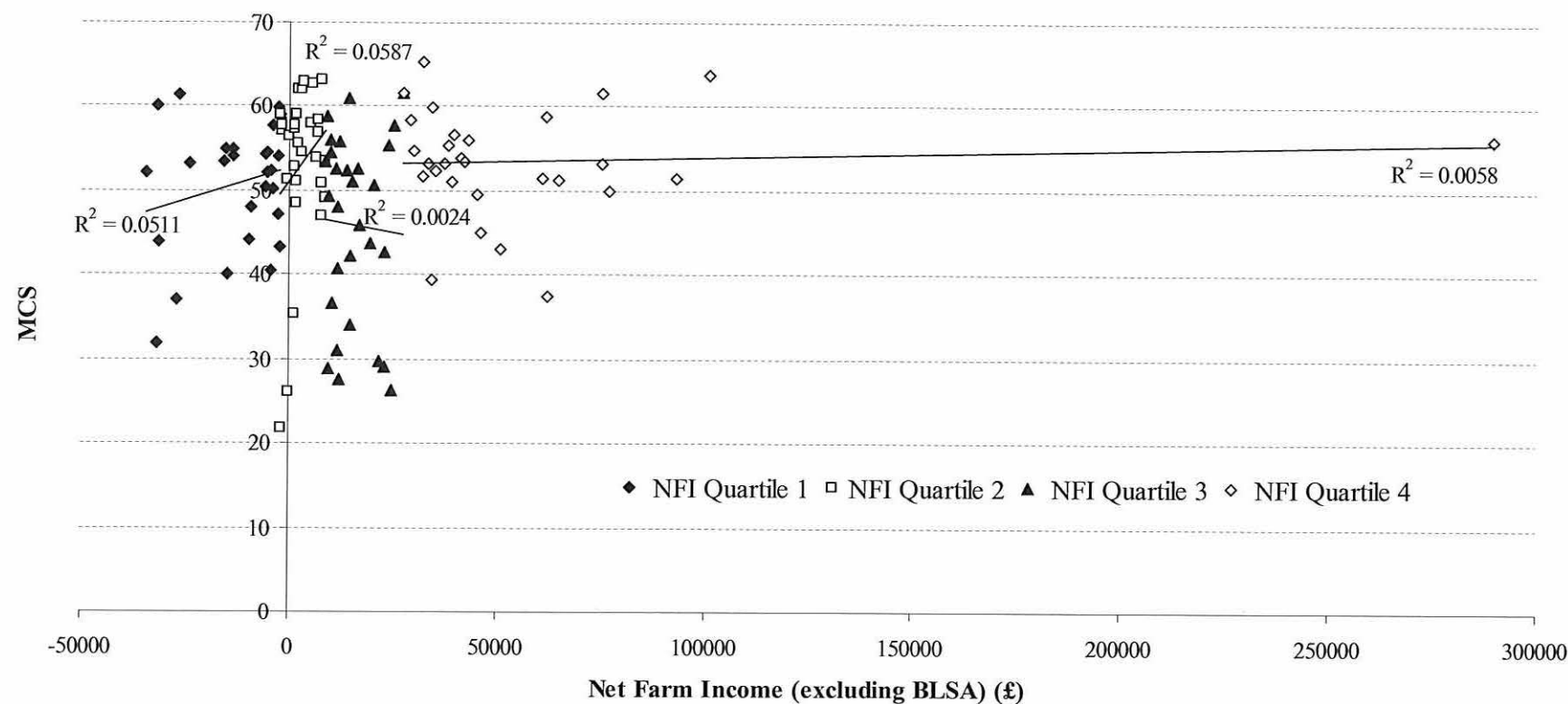
Figure 7.11. Occupier's net income 2001/2002 plotted against SF-36 mental (MCS) health summary scores for farmers in the survey sample (n = 112) with trend lines for each occupier's net farm income quartile plotted separately.
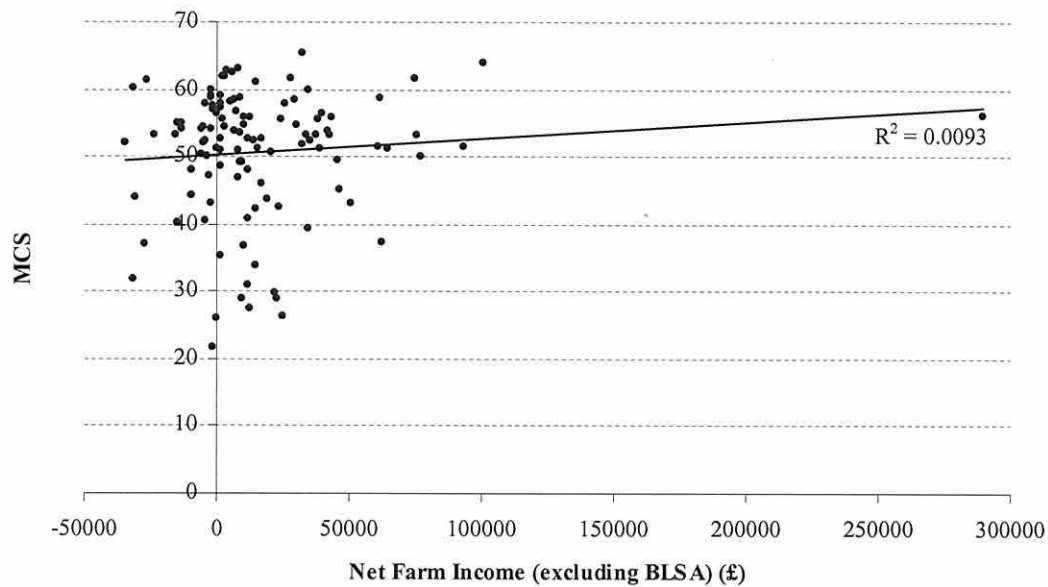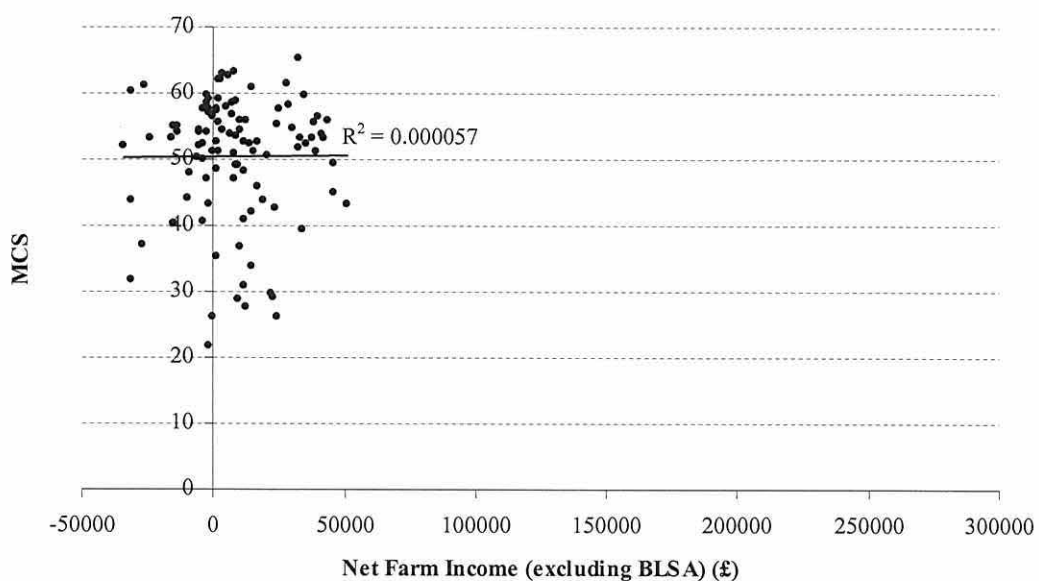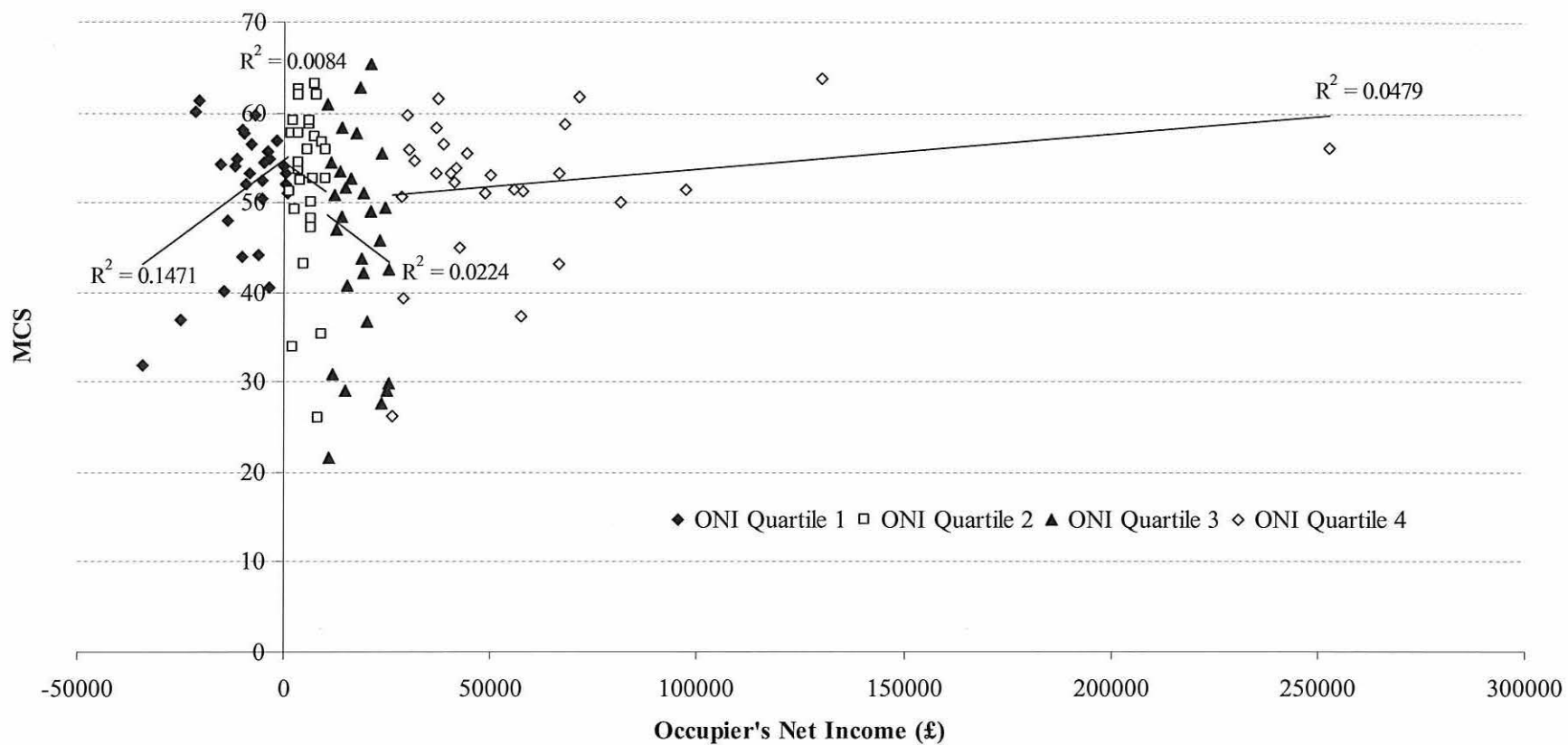
Figure 7.12. Cash income 2001/2002 plotted against SF-36 mental (MCS) health summary scores for farmers in the survey sample (n = 112) with trend lines for each cash income quartile plotted separately.
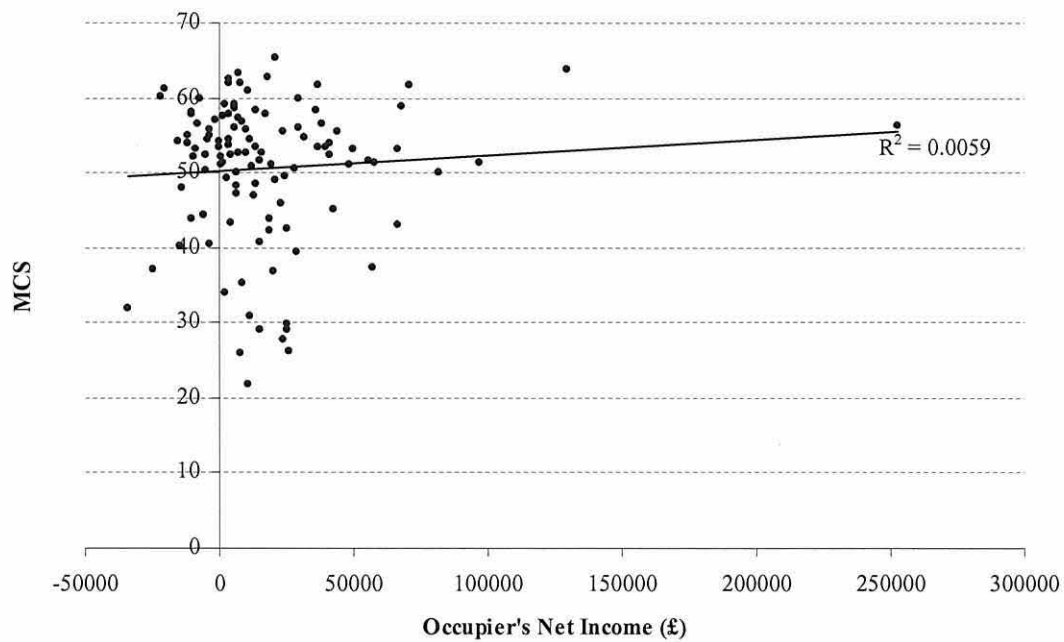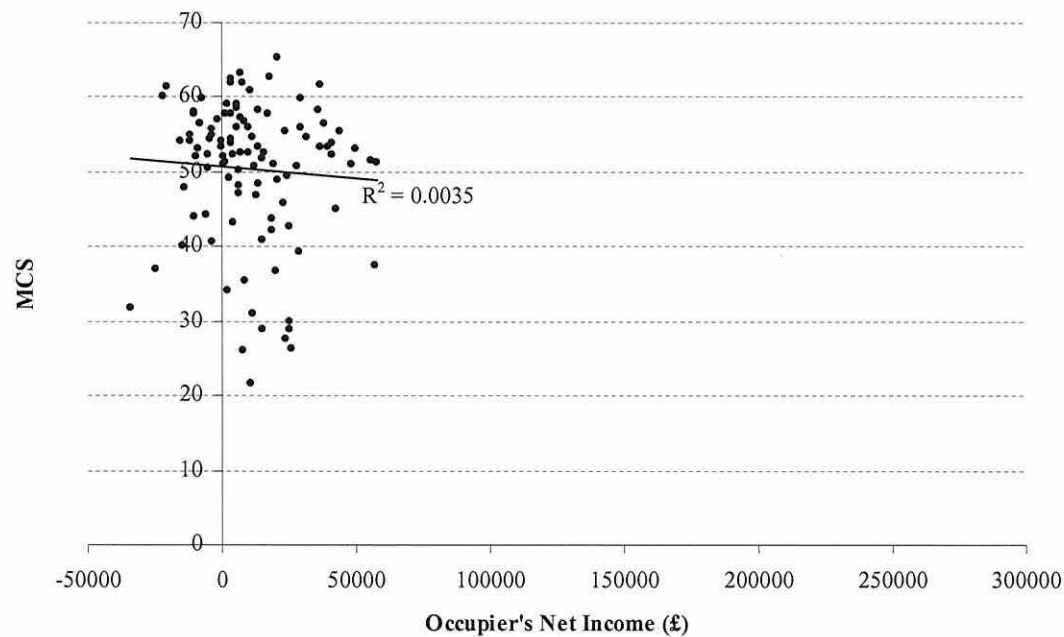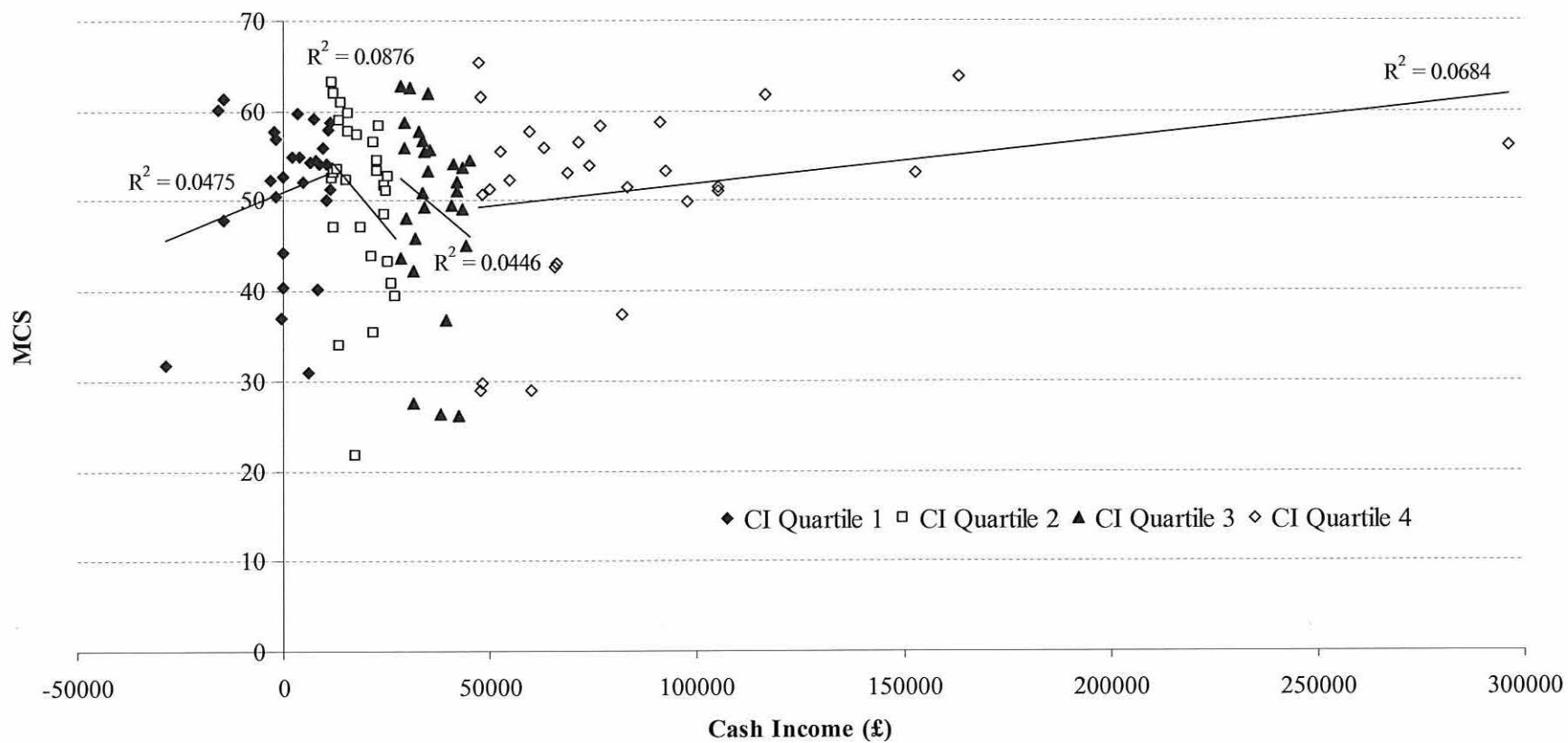
SF-36 mental (MCS) health summary scores were plotted against each of the farm income measures (Figure 7.13). Those principal farmers who lived in households with no off-farm employment and those who lived in households where there was off-farm employment were plotted separately. For all the farm income measures the trend lines indicate a weak positive relationship between mental health and income for those farmers living in households where neither the farmer nor spouse had an off-farm job. Conversely, a weak negative relationship between mental health and income was indicated where an off-farm job was held by either the farmer or spouse. Each of the diagrams showed that up to a certain level of income the mental health status of those with off-farm jobs was generally higher than those without off-farm jobs (Figure 7.13). The point at which the trend lines intersect indicates the level of income beyond which this situation was reversed (Figure 7.13). For net farm income and occupier's net income this income level was approximately £30,000, while for cash income it was around £70,000. Nevertheless, there were very few farms with incomes above these levels where the principal farmer had an off-farm job (Figure 7.13).

There was no significant difference between mean MCS scores for the principal farmers living in a household with off-farm employment compared to those living in a household with no off-farm employment (MCS: Mann-Whitney U Test = 0.222, $p > 0.05$). While mean farm incomes (all measures) were higher for principal farmers living in households with no off-farm employment, the only significant difference was for cash income (Mann-Whitney U Test = 0.035, $p < 0.05$). Further investigation revealed that principal farmers in households with no off-farm employment had farms that were significantly larger in area (actual area: Mann-Whitney U Test = 0.035, $p < 0.05$; effective area: Mann-Whitney U Test = 0.028, $p < 0.05$). Farm areas were earlier shown to be significantly positively correlated to cash income (Table 7.7), so it was not surprising that off-farm employment was related to farm size.

The relationship between mental health and income was further examined for those principal farmers living in households with no off-farm employment by plotting the data using income quartiles (Figure 7.14). Trend lines for net farm income showed a fairly weak positive relationship between mental health scores and income for the first, third and fourth quartiles, while the second quartile showed a strong negative relationship (Figure 7.14a). This pattern was repeated for occupier's net income, although the R^2 values were lower for the second, third and fourth quartiles, while the R^2 value for the first quartile rose substantially (Figure 7.14b). For cash income the

relationship between mental health and income was positive for all the income quartiles, though it was strongest in the first and fourth quartiles with R^2 values of around 0.30 (Figure 7.14c). Differences between mean MCS scores for the quartiles of each farm income measure were not significant (MCS for net farm income quartiles: Kruskal-Wallis = 0.850, p>0.05; MCS for occupier's net income quartiles: Kruskal-Wallis = 0.525, p>0.05; MCS for cash income: Kruskal-Wallis = 0.410, p>0.05).

Figure 7.13. SF-36 mental (MCS) health summary scores plotted against (a) net farm income, (b) occupier's net income, and (c) cash income for principal farmers (n = 80) where the presence or absence of off-farm employment in the household could be ascertained. Solid square: principal farmers (n = 52) in household with no off-farm employment; cross: principal farmers (n = 28) in household with off-farm-employment. BLSA, Breeding Livestock Appreciation; all income figures relate to 2001/2002.

(a)

MCS

Net Farm Income (excluding BLSA) (£)

$R^2 = 0.0375$

$R^2 = 0.0535$

(b)

MCS

Occupier's Net Income (£)

$R^2 = 0.0375$

$R^2 = 0.0895$

(c)

MCS

Cash Income (£)

$R^2 = 0.0375$

$R^2 = 0.0143$
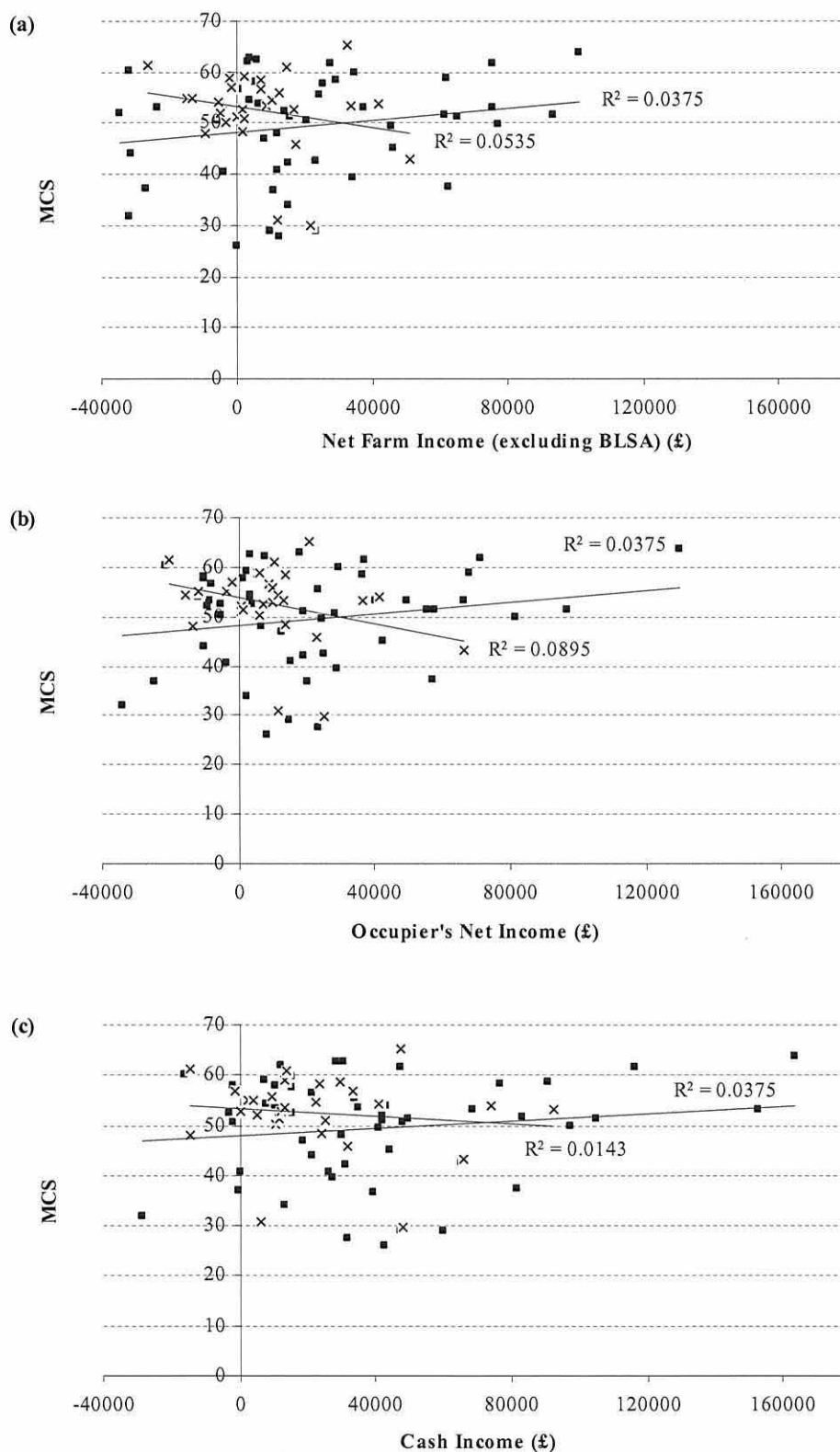
Figure 7.14. SF-36 mental (MCS) health summary scores plotted against (a) net farm income, (b) occupier's net income, and (c) cash income for principal farmers (n = 52) where there was no off-farm employment in the household. Trend lines were plotted separately for each quartile of each farm income measure. BLSA, Breeding Livestock Appreciation; all income figures relate to 2001/2002.
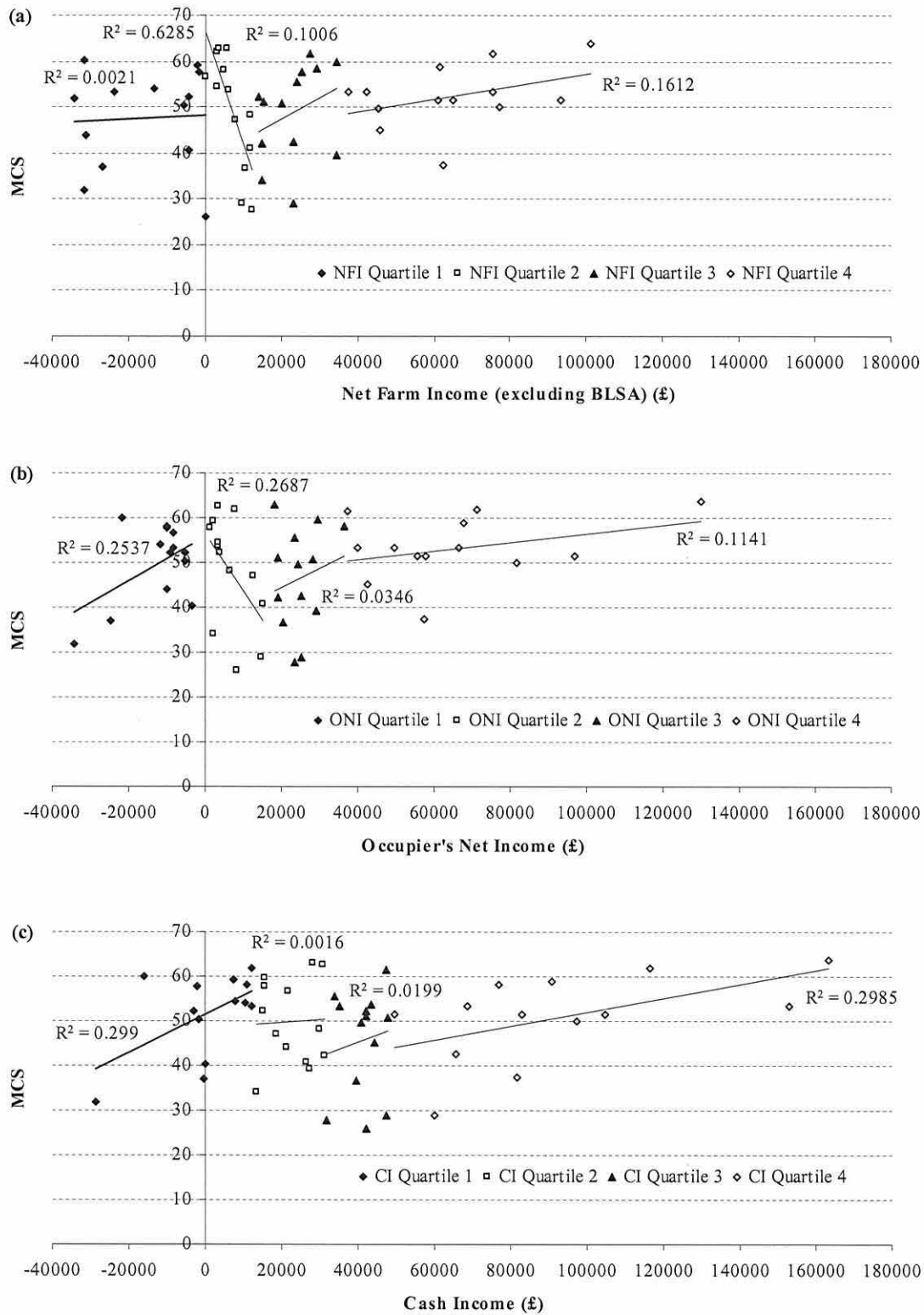
Changes in farm incomes

Farm data was supplied by the Farm Business in Wales for 99 farms for 2000/2001 enabling changes in farm incomes over time to be calculated (Table 7.1). Spearman's rho correlation coefficients for the percentage change in each income measure and the SF-36 health summary measures were obtained. They were all negative and relatively small (Table 7.13). This result was surprising as it suggests an inverse relationship between health and changes in income. However, there was a wide range of percentage changes of incomes across all measures: some individual changes were substantial and were probably attributable to the foot and mouth disease outbreak. In light of this, mean SF-36 summary scores are presented for each income measure by whether the income measure increased or decreased between 2000/2001 and 2001/2002 (Table 7.14).

Table 7.13 Spearman's rho correlation coefficients for farmers' SF-36 physical (PCS) and mental (MCS) health summary scores, and percentage change between 2000/2001 and 2001/2002 for net farm income, occupier's net income, and cash income. BLSA, Breeding Livestock Appreciation; ** significant at the 0.01 level.

			% change for previous year		
	PCS	MCS	Net farm income (excl. BLSA)	Occupier's net income	Cash income
PCS	1.000				
MCS	-0.140	1.000			
% change for previous year:					
Net farm income (excl. BLSA)	-0.118	-0.110	1.000		
Occupier's net income	-0.075	-0.126	0.933**	1.000	
Cash income	-0.121	-0.128	0.797**	0.814**	1.000

Mean SF-36 physical (PCS) and mental (MCS) health summary scores were slightly higher, across all income measures, for farmers that had experienced a fall in income between 2000/2001 and 2001/2002 compared to those whose income increased (Table 7.14). While this was contrary to expectations, none of these differences was statistically significant (Table 7.15).

Table 7.14. Mean SF-36 physical (PCS) and mental (MCS) health summary scores for principal farmers (n = 99) by whether net farm income, occupier's net income , and cash income increased or decreased between 2000/2001 and 2001/2002. s.e., standard error of the mean.

	n	%	PCS	s.e.	MCS	s.e.
Net farm income (excl. BLSA)						
Decreased	46	46.4	52.10	1.18	51.47	1.50
Increased	53	53.6	50.33	1.27	49.41	1.33
Occupier's net income						
Decreased	44	44.4	52.45	1.19	51.04	1.53
Increased	55	55.6	50.12	1.24	49.82	1.32
Cash income						
Decreased	46	46.4	52.03	1.16	51.81	1.49
Increased	53	53.6	50.39	1.29	49.11	1.33

Table 7.15. Results of statistical tests on mean SF-36 physical (PCS) and mental (MCS) health summary scores for principal farmers (n = 99) by whether net farm income, occupier's net income, and cash income increased or decreased between 2000/2001 and 2001/2002.

Variable/test undertaken	PCS		MCS	
	Statistic	Sig	Statistic	Sig
Net farm income (increased/decreased)				
M-W Test (Asymp Sig 2-tailed)	0.333	No	0.202	No
Occupier's net income (increased/decreased)				
M-W Test (Asymp Sig 2-tailed)	0.183	No	0.430	No
Cash income (increased/decreased)				
M-W Test (Asymp Sig 2-tailed)	0.440	No	0.072	No

Table notes
M-W Test: Mann-Whitney U Test.
Sig: Shows whether test result indicated statistically significant difference between SF-36 scores for groups within the variable concerned. 'No' indicates p>0.05.
* Significant at the 0.05 level.

7.3.4 Analysis of SF-36 scores for farmers with respect to net worth

Net worth represents the value of the farm business, and is the difference between the value of the assets and the liabilities. Table 7.16 shows selected statistics relating to the net worth of the principal farmers that responded to the survey. The range of net worth figures was considerable, varying from -£276 to £1,781,065 with a mean of £464,605. One of the largest determinants of farmers' net worth is whether the land they farm is owned or rented. In this study the mean net worth of farmers renting all their land was £63,079 compared to £528,762 for those owning all their land and £435,186 for those

with mixed tenure: differences were statistically significant (Kruskal-Wallis Test: $p<0.001$).

Table 7.16. Selected summary statistics for principal farmers' (n = 112) net worth for 2001/2002.

Summary statistics	Net worth (£)
Minimum	-276
Maximum	1,781,065
Range	1,781,341
Mean	464,605
Standard error of the mean	31,181
Median	393,065
Quartile 1 mean	141,952
Quartile 2 mean	308,618
Quartile 3 mean	499,361
Quartile 4 mean	908,488

Mean PCS and MCS scores for principal farmers ranged from 50.40 to 52.57 and from 48.50 to 52.88 respectively for net worth quartiles (Table 7.17). Differences in mean PCS and MCS summary scores for net worth quartiles were not significantly different (PCS: Kruskal-Wallis = 0.971, $p>0.05$; MCS: Kruskal-Wallis = 0.482, $p>0.05$) (Table 7.17).

Table 7.17. Mean SF-36 physical (PCS) and mental (MCS) health summary scores for principal farmers (n = 112) by net worth quartiles. s.e., standard error of the mean.

	n	%	PCS	s.e.	MCS	s.e.
Net Worth						
Quartile 1	28	25	51.03	1.84	52.88	1.36
Quartile 2	28	25	50.40	1.85	49.50	1.71
Quartile 3	28	25	50.97	1.68	48.50	2.28
Quartile 4	28	25	52.57	0.94	51.53	1.60

Changes in net worth

From the 99 farmers for which records were available, 62 experienced a reduction in their net worth between 2000/2001 and 2001/2002. There were no significant differences between mean PCS and MCS scores for those that experienced a fall in net worth compared to those for which it had increased (PCS: Kruskal-Wallis = 0.389, $p>0.05$; MCS: Kruskal-Wallis = 0.828, $p>0.05$).

7.3.5 Analysis of SF-36 scores for farmers with respect to level of indebtedness

The general level of indebtedness of farmers in the survey sample was very low. Seventy-five farmers were recorded as having a financial liability of some description (loan or overdraft) and 37 had no financial liabilities. SF-36 PCS scores for these two groups were 51.50 and 50.75 respectively and the difference was not significantly different (Mann-Whitney U Test = 0.769; p>0.05). MCS scores were 50.79 and 50.23 respectively and again the difference was not statistically significant (Mann-Whitney U Test = 0.0.551; p>0.05). For farmers with liabilities the ratio of assets to liabilities was calculated: in all cases this had a value of one or greater and for 64 (85.3%) the ratio was three or greater. These figures confirm low levels of gearing for most farm businesses in the survey.

7.4 Discussion

7.4.1 Farmer health and farm variables

This chapter began by examining the physical and mental health of farmers in the context of variables related to their farms, including: farm type; farm area; farm business size; farm tenure; and receipt of foot and mouth disease compensation payments. The only statistically significant result related to the mental health of farmers and the tenure of their farms. Farmers with a mixture of owned and tenanted land had poorer mental health than farmers that either wholly owned or wholly rented their land. There may be a number of explanations for this result. Firstly, it might be expected that rational farmers would only rent additional land to that which they already owned if it could be used profitably. However, adverse economic conditions in agriculture could make the land unprofitable. The farmer may not be able or willing to cease renting it either due to the terms of the lease agreement or the desire to ensure that it is available when economic conditions improve: in the interim period, rent would still have to be paid. Such circumstances could adversely affect farmers' mental health. Alternatively, additional land may only be available to rent on a short period tenancy: this could increase uncertainty and cause anxiety. Farms that are wholly tenanted may have longer term agreements giving security similar to that enjoyed by owner-occupiers. Finally, renting additional land could be a sign of frustration. Farmers may require additional land for the farm business to remain viable or for the farm business to grow.

The absence of any relationship between farmer mental health and being in receipt of foot and mouth disease compensation payments was somewhat surprising. It might have been expected that farmers that had experienced the effects of the FMD outbreak may have had poorer mental health as a result. The findings of Deaville et al. (2003) suggested that the FMD outbreak had an adverse effect on the mental health of those most immediately affected for a considerable period afterwards. An explanation for this may be that many of the compensation payments were made in respect to animals culled for reasons of welfare. Many Welsh farms send their sheep to lowland farms on tack in the winter months and at least a proportion of these payments are likely to have been for sheep that were in an infected area outside Wales. This may have been less distressing to farmers than having animals culled on the farm itself. In addition, compensation payments were reasonably generous and this may have been a mitigating factor in reducing any adverse mental health effects.

The lack of any relationship between farmer health and the other variables is less surprising, although a mental health effect related to the size of the farm (either in terms of area or business size) might have been expected: larger farms are likely to be more stressful to own/manage than smaller ones. Nevertheless, there was no evidence of this in this survey.

7.4.2   Farmer health and farm income

At the outset of this chapter two null hypotheses were presented regarding farmer health and farm generated incomes:

1. The physical and mental health of farming families is not related to farm generated income.

2. The physical and mental health of farming families is not related to changes in farm generated incomes.

Each will be considered in turn.

7.4.2.1 The physical and mental health of farming families is not related to farm generated income

The extremely low correlations between the different income measures and farmers' SF-36 physical and mental health summary scores presented in Table 7.10 means that the first null hypothesis cannot be rejected. Nevertheless, there are a number of observations to be made regarding the mental health of farmers and farm generated incomes.

Firstly, the farms with the highest income appeared to have a distinct upward effect on the plotted trend lines in the scatter diagrams (Figures 7.4 to 7.9). The trend lines for each income measure, that included the whole sample, were positive. Removal of the farms with the highest incomes caused the gradient of the trend lines to decline or become negative. The scatter diagrams examining farm income measures by quartiles confirm this observation (Figures 7.10 to 7.12). Farms in the upper income quartiles for each income measure have a slightly positive trend line (Figures 7.10 to 7.12). Nevertheless, the R^2 for each of these was very small indicating a relatively weak relationship between farmers' mental health and income.

The second set of relevant observations regards the statistically significant differences for farmers' mean mental health scores between income quartiles for two out of the three income measures (Tables 7.11 and 7.12). While the only statistically significant differences in farmers' mental health scores were between net farm income quartiles and occupier's net income quartiles, the scatter diagram plotted for cash income by quartiles shows the same pattern of trend lines for quartiles as occupier's net income. (Figure 7.12). In fact, all three diagrams (Figures 7.10 to 7.12) show a very similar pattern. This is even more surprising given that farmers may move between quartiles for the different income measures depending on their individual situation. For example, a farmer that is in the first quartile for net farm income may be in the second quartile for occupier's net income but back in the first quartile for cash income. The highest R^2, while still only moderate in value (0.1471), was for occupier's net income in the first quartile. The relatively steep trend line suggests that a small increase in occupier's net income may lead to a relatively large gain in mental health. The trend lines for net farm income and cash income also reflect this phenomenon. It could be postulated that farmers facing a negative income position would be preoccupied with their financial position, which would have an adverse impact on their mental health. At very low or negative levels of income, small increases in income could have a very beneficial effect on mental health. The situation was less clear regarding the second, third and fourth quartiles. It could be postulated that once income has reached a certain level that other concerns come to the fore and the effect of income on mental health is reduced.

Related to these findings is the issue of how farmers perceive their income. The Department for Environment, Food and Rural Affairs (DEFRA) acknowledges that occupier's net income will be closer to the income position perceived by farmers' than

net farm income and goes on to hint that cash income should be even closer to the income position perceived by farmers (DEFRA, 2001). Unfortunately, the absence of qualitative data makes it impossible to confirm with any degree of certainty how farmers perceive their income position. A further point may be of interest regarding the survey sample. As participants in the Farm Business Survey, the farmers in the study would be given detailed financial and physical performance information regarding their farm, including comparisons of income with farms of a similar type. Farmers in the Farm Business Survey are therefore likely to be better informed about their own farming activities and their relative performance than non-participants. There may be a mental health effect relating to their relative performance, which may assume a greater significance than would normally be expected.

It is also important to reflect on the fact that the income generated by the farm may be a poor indicator of the household income. Mental health may be influenced to a greater degree by household income as opposed to farm generated income. A significant number of farmers and farmers' spouses indicated that they had an off-farm job. Figure 7.13 suggests that up to a certain level of farm income, whichever measure is used, farmers living in households with off-farm employment had better mental health than those living in households without off-farm employment. At higher levels of farm income the position was reversed. Nevertheless, care is required in interpreting this due to the small sample size and the small R^2 which indicates a weak relationship. Compared to farmers that were in households where there was no off-farm employment, this group of respondents had significantly smaller farms and smaller cash incomes. For the survey sample overall, farm areas were shown to be significantly positively correlated to cash income (Table 7.7). It could be hypothesized that for farm households where income is low (and the farm is smaller) it would be relatively easy for the farmer and/or spouse to find time for off-farm employment. As farm generated income increases (and therefore the size of the farm increases) it may still be necessary/desirable for the household to have an off-farm source of income, but it may be much more difficult to find the required time. Hence the decline in mental health scores as farm generated income increases.

An examination of the mental health and income quartiles for farmers where there was no off-farm employment in the household yielded an interesting result for cash income (Figure 7.14). For each quartile mental health and income were positively related and the R^2 for the first and fourth quarters were moderately high. The main

caveat is that the survey sample had to exclude 32 principal farmers due to being unable to determine whether their household had off-farm employment. Nevertheless, the findings reinforce those reported above and suggest that future studies should ensure that more comprehensive information regarding off-farm employment is collected.

Finally, the filtering of the survey sample by the Farm Business Survey may have influenced the results. Removal of farmers with (suspected) severe health problems is likely to have reduced any income/health effects observed.

7.4.2.2 The physical and mental health of farming families is not related to changes in farm generated incomes.

With regard to the second hypothesis, the survey data did not indicate any relationship between changes in farm income and the physical or mental health of farmers. However, income figures for the previous year were only available for 99 farms: the effect of these omissions is unclear.

7.4.3. Farmer health and net worth

The null hypotheses presented earlier relating to farmer health and net worth were:
1. The net worth of farmers is not related to their physical or mental health.
2. Changes in the net worth of farmers are not related to their physical and mental health.

The evidence from the survey sample suggests that there is no relationship between the physical and mental health of farmers and either their absolute net worth, or with regard to changes in their net worth. It is therefore not possible to reject either of these null hypotheses.

7.5   Conclusion

The inability to reject the null hypotheses from the analysis of the survey data suggests that there is no relationship between farmer health and farm generated income. However, the income/mental health effect at low levels of income merits further investigation in future studies. This is especially the case since farmers with the most severe mental health problems were probably absent from the survey sampling frame.

Future research should include a qualitative dimension to further explore the issue of how farmers perceive their income position. Household income derived from outside the farm should also be included.

Chapter 8: The effect of farmer mental health on adoption: the case of agri-environment schemes

The effect of farmer mental health on adoption: the case of agri-environment schemes

8.0 Abstract

Agri-environmental schemes are policy initiatives designed to promote environmentally sensitive farming and provide benefits in terms of biodiversity, landscape and heritage. However, as uptake of many of these schemes is voluntary, the exact level of benefit they provide depends crucially on their level of adoption. Adoption rates of any new technology or policy are impacted by a wide range of factors including: farmer characteristics, household characteristics, farm structure, the wider social milieu, and the characteristics of the innovation to be adopted. The aim of this chapter is to explore the possibility that a significant "farmer factor" has hitherto been neglected in considering farmers' adoption of agri-environmental schemes. This aspect is farmer health. A survey of the physical and mental health of a sample of farmers was conducted across Wales, UK. Relationships between self-reported physical and mental health, age, marital status, language (English or Welsh), farm size, farm type, farm tenancy, financial situation and involvement in agri-environmental schemes were examined using logistic regression analysis. Variables relating to farmer health were identified as significantly affecting the odds of agri-environmental schemes being adopted by farmers. In particular, the self-reported mental health of farmers adopting agri-environmental schemes in Wales was significantly better than non-adopters. Although correlation was shown, rather than causation, interpretation of the results suggests that poor mental health of farmers may be one cause of non-adoption of agri-environment schemes. This would suggest that one way to improve biodiversity conservation in agricultural landscapes may be to target rural health services in order to enhance support of the physical and mental health of farmers.

8.1 Introduction

Adoption of new technology and innovation has received much practical and academic interest over the last 50 years (Rogers, 2003). At the practical level this interest relates to the desire of policy makers and business to predict uptake of new technologies, products and policies, while at an academic level the process of decision-making and diffusion provide a rich area of investigation (Jones, 1963).

Models of decision-making have identified a series of variables that impinge on the adoption decision, which may be loosely grouped into farmer characteristics, household characteristics, farm structure, the wider social milieu and the characteristics of the innovation to be adopted (when the innovation is a policy these have been called 'scheme' factors). Farmer characteristics of importance include age, education, gender, attitude to risk, and personality (Jones, 1963; Bowler, 1979; Brotherton, 1989; Brotherton, 1991; Nkonya et al., 1997; Vanslembrouck et al., 2002; Sheikh et al., 2003). In addition, farm household characteristics may be important, such as stage in family cycle and level of pluriactivity of the spouse (Potter and Gasson, 1988). Structural variables which have been identified as important include farm type, farm size, and debt to asset ratio (Jones, 1963). More recently the structure of the social milieu has also been identified as important in influencing adoption decisions. This class of variables may include level of extension, information flows, local culture, social capital, attitude of trusted friends, the policy environment and the structure and impact of a range of institutions (Guerin and Guerin, 1994; Neupane et al., 2002; Mathijs, 2003; Solano et al., 2003).

In the last two decades there has been a growth of interest in the adoption of farm systems that are felt to be more environmentally friendly (Padel, 2001), and in the development of specific agri-environment policies (Brotherton, 1991; Wilson, 1997). This is because agriculture has the potential to generate negative externalities (for example, through poor decision-making in the use of agro-chemicals) as well as providing benefits in terms public goods, such as environmental stewardship (Pretty et al., 2000; 2001). Agri-environmental policy seeks to reduce the former and increase the latter by addressing the market failure associated with agricultural practice and the external costs that it imposes on the environment (EC, 1998). This has led to the creation of agri-environmental schemes that offer financial incentives to farmers to adopt agricultural practices that enhance the countryside in terms of creating and preserving landscapes, habitats, wildlife, and land of historical value. A key

characteristic of many of these schemes is that their uptake is voluntary, i.e. farmers can decide whether or not to opt in, but many social benefits should accrue from wide participation. Indeed Potter and Gasson (1988), referring to voluntary land diversion schemes in general, state that, "...participation emerges as the key variable in the success of any scheme". This suggests that the exact level of benefits delivered by agri-environment schemes in terms of biodiversity, landscape and heritage depends crucially on their level of adoption. For these reasons there is a desire to understand the adoption farmers decision related to agri-environmental schemes.

As with other innovations adoption is likely to be influenced by a wide range of factors, some of which have been outlined above. Additional factors relevant to agri-environment scheme adoption include farmer attitudes towards the environment and their conservation orientation. Of particular interest to policy makers are the aforementioned, so-called, "scheme factors". These relate to the technical and economic details of the scheme, and are the elements of the innovation which are directly under their policy makers' control. By influencing the design of the 'scheme' policy makers have the power to increase or decrease adoption of that scheme.

Scheme factors which may impact farmer participation in agri-environment schemes include: the voluntary nature of the scheme; payments; scheme duration/length of interruption between renewal of schemes; scheme logistics (information provided and follow-up/monitoring); severity of change in farm management required by scheme/flexibility of scheme (Guerin and Guerin, 1994; Morris and Potter, 1995; Wilson, 1997). Other scheme factors of importance relate to the requirement to complete sometimes lengthy application forms. For example, recent work evaluating one agri-environment scheme in Wales suggested that 26% of farmers who had considered adopting the scheme had been deterred by the application process (AgraCeas, 2003). The burden of paper work and bureaucracy in farmers' lives is widely recognised (FUW, 2003; DEFRA, 2004), while 'adjusting to new government regulations and policies' and 'filling in government forms' have been shown to be among the highest ranking stressors of farmers (McGregor et al., 1995; Boulanger et al., 1999a). In addition, concern has been raised by farmers regarding the 'small print' of agri-environmental schemes (Midmore et al., 1998). Completion of the required paperwork to join an agri-environmental scheme may therefore deter many farmers already feeling under stress and struggling with routine forms.

While psychological variables have been incorporated into models of decision-making (Edwards-Jones et al., 1998; Willock, 1999), to date no studies have explicitly considered the impact of the health of the farmer on adoption decisions. This is surprising given statistics that indicate farmers being at increased risk of poor physical and mental health. Farming has been identified as a stressful occupation (McGregor et al., 1995) and is associated, in the UK, with a relatively high rate of suicide (see Hawton et al., 1998). Psychological autopsies conducted on farmers that had committed suicide between 1991 and 1993 found that in 69% of cases there was evidence that the farmer had been suffering from a definite or probable mental disorder at the time of death (Hawton et al., 1998). Farmers are also at an increased risk of sustaining a fatal injury at work with data for 1998 to 2001 showing that farming had the second highest fatal injury rate for any occupation in the UK (National Statistics, 2001).

The aim of this chapter is to explore the possibility that a significant "farmer factor" has hitherto been neglected in considering farmers' adoption of agri-environment schemes. The factor is farmers' health. Results from a study of farmers conducted in Wales which compared the self-reported physical and mental health of those that adopted agri-environmental schemes to those that choose not to adopt are reported. These results are further examined with respect to farmer age, farm size and type, farm tenancy and financial situation.

8.2   Materials and Methods

8.2.1   Agri-environment schemes in Wales

Farming in Wales is challenging due to the general topography, poor soils and high rainfall. Over three-quarters (77%) of agricultural land is so poor agriculturally that it is officially designated as Less Favoured Areas allowing special financial support to be given to farmers. Yet, when viewed from an environmental perspective, the Less Favoured Areas may be regarded as "more favoured areas" (Hughes, 1996) for their attractive landscapes, natural habitats and wildlife refuges. In recognition of these environmental assets and the pressure on biodiversity from changing agricultural practice, especially the move towards sheep mono-culture in the uplands, a number of agri-environment schemes have been introduced to Wales.

In Wales, Environmentally Sensitive Areas (ESAs) covering a designated area of around 519,000 hectares, have been an important agri-environmental measure,

operating alongside other schemes such as the Habitat scheme, Tir Cymen (Tidy Land) and Tir Gofal (Land Care) (NAfW, 2003b). A principal feature shared by most agri-environment schemes is that uptake by farmers has been on a voluntary basis. Tir Gofal, for example, was introduced in 1999 as an all-Wales agri-environmental scheme that adopted a whole-farm approach to management agreements. It received 1,380 applications in its first round of submissions between March and May 1999 and a further 870 applications by the end of May 2000 (CCW, 2003). However, the total number of agricultural holdings in Wales for 2000 was 28,410 (NAfW, 2001). Therefore, applications were received from around 8% of holdings in the first year of operation and by January 2003 only 906 agreements (3.2% of the holdings recorded in 2000) had been signed. A recent mid-term evaluation of the Rural Development Programme (RDP) in Wales (AgraCeas, 2003) provides further insight. A sample of 106 farmers, who were non-adopters of any agri-environment schemes, was recruited from across Wales. They were interviewed about their perceptions of the Rural Development Programme, with 88 (83%) indicating an awareness of the Tir Gofal agri-environment scheme but only 18% of the sample had applied to join it.

8.2.2 Measuring health

Many difficulties arise in the measurement of health, a fundamental one being that of definition. While health is often thought of as absence of disease, it has been more positively defined as, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948). Nevertheless, the usefulness of such a definition is limited (Mooney, 1992; Bowling, 1997). In practice an appropriate definition will depend on the ethical, ideological and professional standpoint adopted. Other characteristics of health present challenges when considering measurement, namely: the value-laden nature of health (people will value various aspects of health differently); the fact that health is multi-dimensional; the need for cardinal rather than just ordinal measurement. It has also been recognised that measures of health need to go beyond using bio-medical indicators (for example, blood pressure) and incorporate functional measures that indicate how a person performs social roles. Similarly, the limitations of assessing health care interventions through mortality and morbidity statistics have been recognised. Extensive research in the last thirty years has led to a wide range of health measurement (questionnaire) instruments being devised. These can be used to give insight into quality of life issues arising from

different health scenarios and allow meaningful clinical assessment and economic evaluation of health care interventions. Although there is no agreement among commentators as to an exact definition of 'quality of life', the term can refer to, "...functional ability including role functioning (e.g. domestic, return to work), the degree and quality of social and community interaction, psychological well-being, somatic sensation (e.g. pain) and life satisfaction" (Bowling, 1997).

8.2.3   Survey of farm households in Wales

The survey to measure the health of farmers conducted during 2002, with the assistance of the Farm Business Survey in Wales, was outlined in Chapter 3. Farmers were asked to complete two health questionnaire instruments. The first was the SF-36 health questionnaire (see Chapter 3), while the second was the visual analogue scale (VAS) obtained from the EuroQol EQ-5D health measurement instrument (see Chapter 2, Figure 2.3 and Chapter 4). In addition, a range of socio-demographic information was also collected including gender, age, marital status, number of children, and whether the farmer had any off-farm employment. Logistic regression analysis was used to identify significant variables that affect whether farmers' are likely to be adopters of agri-environment schemes.

8.3   Results

Payments from three different agri-environmental schemes are recorded by the Farm Business Survey in Wales, namely: Tir Gofal, Tir Cymen and Environmentally Sensitive Areas (ESAs). A total of 28 farms were identified as participating in at least one of the schemes with 4 in Tir Gofal, 5 in Tir Cymen, 17 in ESAs and 2 in both Tir Cymen and an ESA.

8.3.1   The variables

The objective of the analysis was to establish which of the available farmer/farm variables, if any, had a significant effect on farmers' adoption of agri-environmental schemes. An examination of the literature outlined in Section 8.1 led to the identification of thirteen variables from the survey data for inclusion in a logistic regression. These comprised of five farm structural variables and eight farmer/household characteristic variables.

Farm structural variables

The farm structural variables were the effective area of the farm in hectares, the proportion of the farm that was tenanted, the farm type (lowland or upland), net farm income, and financial liquidity (available credit balances less overdraft liabilities). The size of farms was examined in terms of the effective agricultural area since this may differ substantially to the actual recorded area. The effective area makes adjustments for non-agricultural land-use (for example, roads, buildings, etc.) and common land used for grazing which is shared with other farmers. The ratio of debts to assets has previously been identified as a farm structural factor in adoption decisions (Jones, 1963). For the survey sample this presented a problem as the overall level of indebtedness of farms in the survey sample was very low with 37 farms having no financial liabilities. Given the difficulty in using the conventional debt/asset ratio, potential financial stress was examined by subtracting overdraft liabilities (current liabilities repayable on demand) from available credit balances to give a crude indication of farm business liquidity.

Farmer/household characteristic variables

Four of the eight variables identified were standard socio-demographic variables relating to the farmers' age, whether they were married, whether they had children under sixteen living in the household, and whether they had any off-farm employment. The language in which the questionnaire was completed (English or Welsh) was used to highlight any possible cultural influence on the adoption decision. The remaining three variables related to the farmers' health status as measured by the SF-36 and VAS questionnaire instruments described above in Section 8.2.3.

8.3.2   Logistic regression model

Logistic regression analysis was conducted using the computer software programme Statistical Package for the Social Sciences (SPSS) Version 14. A logistic regression was used with the following functional form:

$$P(Y) = \frac{1}{1 + e^{-(b_0 + b_1 X_1 + b_2 X_2 + \ldots + b_n + X_n + \varepsilon_i)}}$$

where P(Y) represents the probability of an event occurring, in this case that a farmer will be an adopter of agri-environment schemes. b_0 is a constant, while X_1 to X_n are explanatory variables with coefficients b_1 to b_n and ϵ is the error term.

While a considerable range of variables has been examined in the past with respect to adoption decisions by farmers, health status variables have not previously been included. Due to the exploratory nature of this research, stepwise regression was adopted. Although regression techniques which use a computer-controlled stepwise procedure are controversial, they are regarded as useful for research that is purely predictive or exploratory (Menard, 2002). Backward elimination was used to avoid the potential problem of suppressor effects that may occur with forward elimination methods (Field, 2005).

Table 8.1. The variables identified in the survey sample for inclusion in the logistic regression analysis and whether they were retained in the final model.

Variables	Variable continuous (con) or categorical (cat)	Variables retained in final model or step at which variable was removed using the Backward Likelihood Ratio stepwise method
Farmer/household characteristics		
Age of farmer	con	Retained in final model
Marriage indicator	cat	5
Off-farm job indicator	cat	2
Children indicator	cat	6
SF-36 physical health score (PCS)	con	7
SF-36 mental health score (MCS)	con	Retained in final model
Visual analogue scale (VAS) score	con	Retained in final model
Language of questionnaire completed	cat	Retained in final model
Farm structure		
Effective area	con	Retained in final model
Proportion of actual farm area tenanted (%)	con	8
Farm type (lowland or upland)	cat	9
Net farm income	con	3
Liquid balances	con	4

Five of the original thirteen variables were retained in the final model, these being: the age of the farmer, the farmers' mental health score from SF-36, the farmers' visual analogue score, the language version of the questionnaire completed, and the effective area of the farm (Table 8.1). The significant model chi-square statistic and non-significant Hosmer and Lemeshow statistic indicate that the model is successfully predicting whether or not farmers are adopters of agri-environment schemes (Table 8.2). The Cox and Snell R square and Nagelkerke R Square statistics indicate a modest fit for the model (Table 8.2).

Table 8.2. Results of statistical tests on the logistic regression model.

Test	Statistic	Significance
Model Chi-square	22.249	$p < 0.001$
Hosmer and Lemeshow Chi-square	10.823	$p > 0.050$
Cox & Snell R Square	0.182	-
Nagelkerke R Square	0.268	-

The presence of multicollinearity was tested by obtaining the Tolerance and Variance Inflation Factor (VIF) statistics from a linear regression using the original set of variables (Field, 2005). Tolerance and VIF statistics are related as follows:

$$VIF\ (b_i) = \frac{1}{Tolerance} \quad where, \quad Tolerance\ (b_i) = 1 - R_i^2 \ .$$

Hutcheson and Sofroniou (1999) suggest that Tolerance statistics of less than 0.2 and VIF statistics that exceed 5 indicate a problem with multicollinearity. For the model being considered, the Tolerance statistics are all above 0.2 and VIF statistics are all below 5 suggesting that multicollinearity is not significant (Table 8.3).

Table 8.3. Tolerance and variance inflation factor (VIF) statistics for variables in the logistic regression model.

	Tolerance	VIF
Age of farmer	0.345	2.895
SF-36 mental health score (MCS)	0.669	1.494
Visual analogue scale (VAS) score	0.394	2.537
Language of questionnaire	0.838	1.194
Effective area of farm (hectares)	0.880	1.136

The Wald statistic for each of the five coefficients was significant at the five percent (one percent for the age of farmers) indicating that they are significantly different to zero (Table 8.4). Exp(b) values indicate the change in odds of a farmer being an adopter of agri-environment schemes with a unit change in the predictor and all other variables held constant (Table 8.4). Scores over one indicate that as the predictor increases the odds of a farmer being an adopter of agri-environment also increase. Conversely, scores of less than one show as the predictor increases the odds of a farmer being an adopter of agri-environment schemes decrease.

Table 8.4. Statistical results for a logistic regression with the adoption of agri-environment schemes as the dependent variable and farmers' age, SF-36 mental health score (MCS), visual analogue scale (VAS) score, questionnaire language, and effective area of farm as explanatory variables.

	b	s.e.	Wald	Sig	Exp(b)	95% Confidence Interval Lower	Upper
Age of farmer	-0.085	0.031	7.731	0.005 **	0.918	0.865	0.975
SF-36 mental health (MCS)	0.084	0.034	6.091	0.014 *	1.087	1.017	1.162
Visual analogue scale score	-0.051	0.020	6.206	0.013 *	0.951	0.914	0.989
Language of questionnaire	1.395	0.609	5.256	0.022 *	4.037	1.224	13.307
Effective area of farm (hectares)	0.008	0.003	5.483	0.019 *	1.008	1.001	1.015
Constant	1.651	2.628	0.395	0.530	5.212		

Table 8.5. Statistical results for a logistic regression with the adoption of agri-environment schemes as the dependent variable and farmers' age, visual analogue scale (VAS) score, questionnaire language, and effective area of farm as explanatory variables.

	b	s.e.	Wald	Sig	Exp(b)	95% Confidence Interval Lower	Upper
Age of farmer	-0.075	0.029	6.808	0.009 **	0.928	0.877	0.981
Visual analogue scale score	-0.028	0.017	2.642	0.104	0.972	0.939	1.006
Language of questionnaire	1.021	0.562	3.293	0.070	2.775	0.922	8.354
Effective area of farm (hectares)	0.008	0.003	5.826	0.016 *	1.008	1.002	1.015
Constant	3.788	2.339	2.623	0.105	44.158		

Table 8.6. Statistical results for a logistic regression with the adoption of agri-environment schemes as the dependent variable and farmers' age, SF-36 mental health score (MCS), questionnaire language, and effective area of farm as explanatory variables.

	b	s.e.	Wald	Sig	Exp(b)	95% Confidence Interval Lower	Upper
Age of farmer	-0.056	0.026	4.803	0.028 *	0.946	0.899	0.994
SF-36 mental health (MCS)	0.055	0.032	2.964	0.085	1.057	0.992	1.126
Language of questionnaire	0.926	0.544	2.902	0.088	2.525	0.870	7.330
Effective area of farm (hectares)	0.007	0.003	4.987	0.026 *	1.007	1.001	1.014
Constant	-2.234	2.095	1.137	0.286	0.107		

Table notes
b: Variable coefficient in logistic regression equation.
s.e.: Standard error of the coefficient.
Wald: Wald statistic.
Sig: Statistical significance of the Wald statistic.
**: Significant at the 1% level.
*: Significant at the 5% level.
Exp(b): Change in odds
Lower/Upper: Lower and upper limits of the 95% confidence interval for Exp(b).

Therefore, as the age of a farmer increases the odds that they are an adopter of an agri-environment scheme decrease (Table 8.4). With regard to the effective area of a farm, the larger the area the more likely that the farmer will be an adopter of agri-environment schemes (Table 8.4). Interestingly, the coefficient (b) and Exp(b) value for the language of questionnaire variable indicate that those farmers completing a questionnaire in Welsh were more likely to be adopters of agri-environment schemes than those completing the English version (Table 8.4). The effect of the health status of farmers on the odds of them being an adopter of agri-environment schemes is less clear. The results for the farmers' visual analogue scores (VAS) suggest that as these scores increase (indicating better health) the odds of a farmer being an adopter of agri-environment schemes decrease (Table 8.4). However, as farmers' SF-36 mental health scores increase (indicating better mental health) the odds of them adopting agri-environment schemes also increase Table 8.4). Table 8.5 shows the effect of removing the farmers' SF-36 mental health scores from the model, while Table 8.6 shows the effect of removing the farmers' VAS scores. It appears that removing either health measure results in the coefficient of the remaining health measure becoming non-significant (Tables 8.5 and 8.6).

To examine further the effects of farmers' health on their adoption of agri-environment schemes, mean VAS scores and SF-36 mental health scores were compared for adopters and non-adopters (Table 8.7). While there was no significant difference between VAS scores for adopters and non-adopters, the difference in their SF-36 mental health scores were significantly different (Table 8.7). Spearman's rho correlation coefficients were also examined for the variables in the model. Farmers' VAS scores were found to be significantly correlated with both their age and their SF-36 mental health score (Table 8.8).

Table 8.7. Comparison of mean values of selected variables for adopters and non-adopters of agri-environment schemes.

Variable	Sample Mean	Category	n	Mean	s.e	M-W Test	p	Sig
Visual analogue scale score	81.52	Adopters	28	80.82	2.230	-1.030	0.303	No
		Non-adopters	83	81.76	1.768			
SF-36 mental health score (MCS)	50.86	Adopters	28	53.51	1.676	-2.170	0.036	Yes[*]
		Non-adopters	83	49.97	0.983			

Table notes
n: Number of respondents.
s.e.:   Standard error of the mean.
MCS: Mental Component Summary score. This is the SF-36 summary measure that indicates the mental
           health of respondents.
VAS: Visual Analogue Scale score.
M-W Test: Mann-Whitney U Test.
Sig: Shows whether Mann-Whitney U Test (2-tailed) result indicated statistically significant difference
           between mean scores for the variable concerned scores for adopters/non-adopters of agri-environment
           schemes. 'No' indicates p>0.05.
* :   Significant at the 5% level.

Table 8.8. Spearman's rho correlation coefficients for visual analogue scale (VAS) scores, SF-36 mental (MCS) health summary scores, effective area of farm, and age of farmer. ** Correlation is statistically significant at the 1% level (2-tailed).

Variables	VAS	MCS	Effective area of farm	Age of farmer
VAS	1.00			
MCS	0.26 [**]	1.00		
Effective area of farm	0.03	-0.01	1.00	
Age of farmer	-0.28 [**]	-0.04	-0.04	1.00

8.4   Discussion

The logistic regression analysis suggests the adoption of agri-environmental schemes by farmers is likely to be affected by their age, the size (effective area) of the farm, and their health (Table 8.4). The increased odds of adoption arising from completion of the questionnaire in Welsh indicate a possible cultural dimension. The modest Cox and Snell R Square and Nagelkerke R Square statistics suggest that the inclusion of other variables not present in the dataset might improve the predictive power of the model.

With regard to farmer health there is an apparent contradiction. Better mental health appears to improve the odds of farmers adopting agri-environmental schemes, while better general health seems to have the reverse effect. Although statistical tests did not indicate the presence of any significant multicollinearity in the model, the correlation between the two variables may be a factor since the VAS score is likely to capture elements of both physical and mental health (Tables 8.3 and 8.8). While the

presence of two apparently contradictory health variables in a final predictive model could be problematic, the main purpose of this chapter is simply to highlight the potential importance of health related issues in adoption decisions. Should any further research be undertaken in this area then clearly a large samples size is required and some further consideration may be needed as the exact measurement of health to be included in the model.

8.5 Conclusion

The sample size here is relatively small, but despite this small size statistical differences in the mental health status of adopters and non-adopters were identified. Clearly a larger survey is needed to explore the relationship between farmer health and adoption and we suggest that future research examining the adoption of agri-environment schemes by farmers should include objective measurement of farmer health status, particularly mental health. This would establish with greater certainty the role of health as a 'farmer factor' influencing the adoption of agri-environment schemes. If this work supports our initial theory that reduced mental health tends to inhibit adoption of agri-environment schemes, then it would be clear that the provision of better health care to farmers may bring environmental benefits.

Chapter 9: General discussion

General discussion

9.0 Introduction

The purpose of this chapter is to reflect on what has been learned about farmer health from the research presented in the earlier chapters and to explore the implications with respect to future research and for health and agricultural policy.

9.1 General discussion

9.1.1 Physical health

Comparison to general population

The physical health status of respondents to the main survey was measured using the SF-36 along with a visual analogue scale (VAS), while the physical health of agricultural show survey respondents was measured using a visual analogue scale only in year 3. Results from the main survey indicated that the physical health of farmers and farmers' spouses in the survey sample compared favourably to that of the general population reported in the 1998 Welsh Health Survey (NAfW, 1999). Farmers and farmers' spouses in the main survey sample experienced no more acute or chronic illness than the general population and for some categories of illness incidence rates were substantially lower. This was reflected in the higher mean SF-36 physical (PCS) health summary scores (indicating better health) for every age group of farmers and farmers' spouses compared to those recorded in the 1998 Welsh Health Survey for the general population.

The generally favourable comparison to the general population may be partly attributable to the healthy lifestyles adopted by respondents. Very few respondents were smokers and their alcohol consumption was mainly within current Department of Health recommendations. However, the survey method is likely to have affected these results. As reported in Chapter 3, the Farm Business Survey reserved the right not to survey farmers and farmers' spouses known to have serious medical conditions/undergoing major treatment or where alcohol abuse was suspected. A likely consequence of this policy is that chronic conditions are under-represented in the results obtained. For this reason care should be exercised in extrapolating these results to the farming population in Wales as a whole.

Nevertheless, in the two instances where a VAS was used in the study, scores obtained were slightly lower (indicating poorer health) than the norms produced by Kind *et al.* (1999). This apparent contradiction may be attributable to the very small number of respondents used to compile the VAS norms for the general population of Wales.

Social-demographic variables

The main survey allowed a wide variety of socio-demographic data to be collected from respondents, including gender, age, questionnaire language, marital status, household role, details of children as well as tobacco usage and alcohol consumption. There were few statistically significant relationships between the socio-demographic variables of respondents to the main survey and their physical health status as measured by the SF-36 (Chapter 3). Relationships shown to exist were mainly age related and derived from the significant negative correlation between the physical health status and age of respondents.

Results using the visual analogue scale (VAS) scores from the main survey were generally consistent with those obtained from the SF-36 physical (PCS) health summary scores. The only statistically significant results obtained using the VAS were for age related socio-demographic characteristics (age and the presence of children in the household) for principal farmers (Chapter 4). The same results were obtained from the SF-36 PCS scores, although there was an additional statistically significant result for the household role of farmers' spouses that was not found using the VAS. The significant positive correlations between VAS scores and both SF-36 summary scores for respondents, presented in Chapter 4, showed that VAS scores appeared to capture elements of both physical and mental health. This is reinforced by findings from the year 3 agricultural show survey where there was a significant negative correlation between VAS scores (higher indicates better health) and GHQ-12 scores (lower indicates better mental health). Nevertheless, there was no significant difference in VAS scores between farm family members and other attendees as had been indicated by the GHQ-12. There were also no statistically significant scores for the socio-demographic characteristics (gender, age, residency location, occupational status) of respondents.

9.1.2 Mental health

Comparison to general population

The research conducted and summarised in this thesis has explored the mental health of farmers and their spouses through two complementary types of survey. The surveys conducted for three consecutive years at agricultural shows produced a large number of respondents from the farming community and the general population. While these surveys were subject to the methodological limitations outlined in Chapter 2, the finding that the mental health status of farmers and farmers' spouses was worse than that of the general population for all three years was an interesting finding. This was in contrast to the findings in the main survey of farmers and farmers' spouses conducted through the Farm Business Survey in Wales. The average mental health status of respondents to the main survey was found to be no worse than that of the general population when making comparisons with the results of the 1998 Welsh Health Survey.

This presents a paradox: one survey suggesting that the mental health status of farmers and farmers' spouses was worse than the general population, while the other suggests that it was about the same overall and even slightly better for some age groups. The apparent contradiction may be explained by the nature of the survey questionnaire instruments used in each part of the study. The two main survey instruments used, the GHQ-12 and SF-36, measure very different domains of health. The GHQ-12 specifically measures mental health status through breaks in normal function compared to the generic approach of the SF-36. The results suggest that findings were sensitive to the survey instrument used and it was unfortunate that the GHQ-12 was not included in the main survey to gain further insight into this phenomenon. Nevertheless, the findings here mirror those of a recent study of English farmers (Thomas *et al.*, 2003). Thomas and colleagues (Thomas *et al.*, 2003) found that while farmers had a lower prevalence of psychiatric morbidity than the general population, they were more likely to report that life was not worth living. Whether "life is worth living" is a dimension of mental well-being that is explored by the GHQ-12, but neglected by the SF-36. In view of this, future studies of farm family mental health should ensure that a GHQ type questionnaire instrument is included in addition to any generic health instrument used.

Social-demographic variables

Analysis of the SF-36 mental (MCS) health summary scores for respondents to the main survey and their socio-demographic characteristics did not reveal any statistically significant relationships. For the agricultural show surveys, the socio-demographic variables were gender, age, residency location, and occupational status. Only occupational status in year 2 and age in year 3 showed a significant difference in GHQ-12 scores for respondents.

9.1.3 Farmer health and the financial status of farms

Farm related variables

While the relationship between the health of farmers and farm financial status was the main focal point for this study, the physical and mental health of farmers in the main survey was also examined in relation to other farm related variables (farm type; actual and effective areas; ESU size groups; farm tenure; FMD compensation payments). The only significant result found was for farm tenure and mental health. The mental health status of farmers that had a mixture of owned and rented land was poorer than for those farmers that either wholly rented their land or wholly owned their land. While it was unclear as to why this should be the case, a number of possible explanations were discussed in Chapter 7. These included: farmers retaining rented land that is unprofitable; the possibility that wholly tenanted farms may have longer-term agreements which offer greater security of tenure as well as reducing uncertainty; renting land could be an indication of frustration in that extra land is required for the farm to remain viable or to grow.

Farm income

There was no significant correlation between farmer physical health and any of the three farm income measures used in the study. Analysis of farmers' SF-36 physical (PCS) health summary scores by farm income quartiles confirmed that there was no significant relationship between farm generated income and the physical health status of farmers (Chapter 7).

The position with regard to mental health was more complex. Similar to farmer physical health, there was no significant correlation between farmer mental health and any of the farm income measures. However, analysis of farmers' SF-36 mental (MCS) health summary scores by farm income quartiles revealed that there were significant

differences for net farm income quartiles and occupier's net income quartiles, though not for cash income quartiles. Interestingly, the lowest mean mental health scores were recorded for the third quartiles for all farm income measures. Further investigation using scatter diagrams revealed that there was only a very weak overall link between farm generated incomes and farmer mental health. When examined by farm income quartile, the relationship between farm income and farmer mental health was most pronounced for the first quartile. At low levels of farm income, such as those found in the first quartile, it might be expected that any increase in income would result in higher mental wellbeing. Beyond the first quartile the position is less clear. It may be that once a certain level of farm income is achieved other factors dominate the determination of mental wellbeing.

A substantial number of farm households in the main survey indicated that the principal farmer and/or farmers' spouse had an off-farm job. Analysis in Chapter 7 suggested that up to a certain level of farm income, whichever measure is used, the mental health of farmers living in households with off-farm employment had better mental health than those living in households without off-farm employment. At higher levels of farm income the position was reversed. This suggests that up to a certain farm size off-farm employment in the household can be accommodated relatively easily and that there are positive mental health benefits to the farmer. Better mental health may derive from the extra income received (which may be more regular/certain than farm generated income), increased social contact, or a combination of these factors.

Finally, with respect to farm generated income, changes over the twelve months from 2000/2001 to 2001/2002 were examined with respect to farmer health. Analysis of the data showed that there were no significant relationships between mean changes in farm income (all measures) and the SF-36 physical (PCS) and mental (MCS) health summary scores for respondents.

Other financial variables

Debt can be a source of anxiety, especially for those whose income is low and/or falling. However, the level of indebtedness among respondents to the main survey was extremely low; there was no significant relationship between farmer health and levels of indebtedness. There were also no significant relationships between farmers' health and their level of net worth or changes in their net worth compared to the previous twelve months.

Agri-environmental scheme adoption

The possibility that the mental health of farmers might affect their decision as to whether to adopt agri-environment schemes is an interesting finding that deserves further research. The growing emphasis on the production of environmental public goods by farmers, as opposed to conventional agricultural outputs, means that this has potentially significant policy implications (see Section 9.3 below).

9.1.4 Health care service utilisation

Levels of health care service utilisation by respondents to the main survey tended to reflect their physical health status. Regression analysis showed that the number of contacts with the family doctor in the past twelve months was significantly related, as expected, to the physical health status of respondents. Analysis by socio-economic variables showed that for principal farmers (mainly males) the number of contacts with the family doctor was significantly related to age, children in the household (age related), and number of medical conditions. Compared to the general population, the utilisation of primary and secondary care services was lower for respondents to the main survey. This was somewhat surprising, given that the incidence of acute and chronic illness was broadly similar for survey respondents and the general population. This may suggest that latent demand for health care services exists among the farming population. Evidence for this is strengthened by two observations: distance was not a significant factor in determining the number of contacts with the GP while surgery opening hours were clearly highlighted as a barrier to accessing health care services. Since in the UK GPs are the 'gateway' through which secondary health care services are accessed, this might explain the lower utilisation rates for survey respondents in this area as well. On the other hand, the lower utilisation rates of primary and secondary health care services by survey respondents may be a replication of the phenomenon observed in a previous study by Haynes and Bentham (1982) who found that among those with long-standing illness, GP consultation rates were higher for urban residents compared to rural residents.

9.2 Strengths and weaknesses of the study methodology

9.2.1 The agricultural show surveys

Conducting the surveys at the agricultural shows enabled health data to be collected from a large number of farmers in a cost-effective manner. Visiting shows on consecutive years also allowed inter-temporal comparisons to be made in a way that was precluded by the nature of the main survey. A possible criticism of these surveys lies in the intrinsic characteristics of agricultural shows themselves, in that they tend to attract those with an interest in rural affairs with the time to attend. The non-farming respondents were therefore predominantly other rural residents, a high proportion of whom were retired. This has obvious implications with respect to how representative of the general population the survey sample might be regarded. Nevertheless, despite this weakness, the agricultural show surveys were a valuable exercise that gave additional insight into the mental health of farmers.

9.2.2 The main survey

Farm Business Survey

The use of the Farm Business Survey to deliver questionnaires to farm households in Wales was a major strength of the study. It allowed detailed farm physical and financial data from farms throughout Wales, using an established and proven methodology, to be incorporated into the study and matched to comprehensive health data. This is the first time in the UK that an investigation into farmer health has had access to such detailed farm financial data. Nevertheless, there were also some difficulties with using the Farm Business Survey.

The first significant issue related to the filtering of the survey sample by Farm Business Survey to exclude those households where there was a known difficulty such as depression, an acute medical condition, or suspected alcoholism. While it is difficult to predict the exact effect that this had on the survey results, it could easily be overstated. Only nine completed non-response forms indicated a medical reason for non-delivery of a questionnaire pack. In addition, it was possible, even likely, that those households would not have completed the health questionnaires in any event. Finally, with respect to sample filtering, there were two potential benefits. Firstly, those individuals that were most vulnerable to any adverse effect from participating in the study were removed. This was reassuring, since the welfare of participants must always be the prime consideration in conducting research. Secondly, any findings

excluding the aforementioned would be almost certainly be strengthened with their inclusion.

The second significant issue revolved around the difficulty of ensuring an adequate rate of response. The response of 195 individuals representing 125 farms was disappointing given that deliveries were made to 325 farms and the total number of farms in the Farm Business Survey in Wales was 593. With the benefit of hindsight there were some changes that could have been made to this methodology that might have enhanced the rate of response.

One precondition imposed by the Farm Business Survey was that there could be no follow-up of non-respondents, such as that advocated by Dillman (1978). While it is impossible to assess the exact impact of adopting this method, it would probably have improved the response rate. Perhaps a more serious omission was that those farm households that do not routinely receive a visit from an Investigational Officer were not given the opportunity to participate in the study. In retrospect this aspect should have been pursued more vigorously in the initial negotiations, as a number of farm households were subsequently omitted. A questionnaire pack sent by post through the Farm Business Survey with a suitable covering letter would have generated additional responses without jeopardising the established relationships with farmers.

Finally, the Investigational Officers should have been engaged to a greater extent in the survey through personal incentives to market the survey. Anecdotal feedback through the Farm Business Survey office suggested that responses were not evenly distributed among Investigational Officers and that one individual was particularly successful. Unfortunately, it was not possible to ascertain how well the survey was marketed by the Investigational Officers. Completion of the health survey was entirely voluntary on the part of the farmers and spouses contacted and encouraging farmers and spouses to participate in the survey was no guarantee that they would actually complete the questionnaires. It could also have transpired that all or most of the farms under particular Investigational Officers refused to participate in the survey. Conversely, for other Investigational Officers most of their farms might have had a natural propensity to participate in surveys. While both of these scenarios were possible, they seem intuitively unlikely. Differences in response rates between Investigational Officers were likely, though it was impossible to verify, to be correlated with the effort made to persuade farmers and their spouses to participate. The provision of a small number of modest cash prizes for the highest number of completed

health questionnaires received might have been provided sufficient extra incentive for Investigational Officers to encourage farmers to participate.

The questionnaire

Generally, health questionnaires that were returned in the main survey were completed to a high standard by respondents with very few missing items, suggesting that it was easily understood. However, while the questionnaire had been designed with ease of completion in mind, the final version comprised of twelve A4 sheets. On reflection, the questions pertaining to health care service utilisation could have been simplified without losing any useful data. Similarly, the section relating to illnesses could potentially have been shortened.

Impact of the foot and mouth disease crisis

The Farm Business Survey annual report for the period covered by the study (UWA, 2003) includes the following cautionary note:

> "…it is impossible to capture the full effect of FMD in the statistics shown and [users] should use caution in interpreting the results from what has been a most exceptional farming year."

Unfortunately, it is impossible to establish the precise effects of FMD on the study results. The exceptional nature of the farming year to which the farm financial data relates strengthens the case for further research in a more "normal" year.

9.3   Policy implications and recommendations for future research

Farm income

The absence of any clearly definable link between farm income and farmers' health precludes any specific policy recommendations in this area. However, the inter-quartile farm income/farmer mental health analysis suggests that further investigation is merited (Chapter 7). Similarly, the effect that off-farm employment may have on the mental health of farmers is an area that warrants further research. Farmers in households where there was off-farm employment generally appeared to have better mental health than farmers in households with no off-farm employment up to a certain level income. Qualitative research methods could provide insight into whether the better mental health indicated is purely from an income effect, or whether being away from the farm with greater outside contact was a contributory factor. A future study should consider collecting information on the level (amount) of off-farm

income and possibly incorporating any transfer payments such as pensions or child allowances/family tax credits. This would allow a more complete picture of farm household income to be established and income could be equivalised (see McClements, 1977) to allow more accurate comparisons between household of different compositions. However, the sensitive nature of this information would present a formidable obstacle to data collection.

Access to health care

In terms of health care service utilisation and barriers to accessing service provision, GP surgery opening hours were a key issue to survey respondents. This is an issue that has attracted the attention of the general public throughout the UK as well as sections of the media (Hall, 2005; Hope, 2005). This issue may become even more relevant given an aging farming population. The mean age of farmers in the main survey sample was just over 51, while the average among farmers in the whole of Wales is 55 (NAfW, 2001). The increasing mean age of farmers and the significant negative correlation between physical health and age is likely to ensure that access to health care services remains an important issue to the farming community. It remains to be seen whether the additional funding will be made available to allow doctors to provide extended opening hours.

Agri-environment schemes

The protection and enhancement of the natural environment has emerged in recent years as a key objective of agricultural policy. Agri-environment schemes remain a key policy instrument in delivering these public goods, yet adoption by farmers is on a voluntary basis. Results from this study suggest that agri-environment schemes may form the interface between agricultural, environmental and health policy. The provision of environmental public goods is becoming an increasingly important part of farming in Wales, a trend that is likely to continue for the foreseeable future. The finding that farmers' mental health status may have a key role in determining their adoption behaviour towards agri-environment schemes therefore has great potential significance. Further research is required to establish the nature and extent of the relationship between farmers' mental health and their adoption of agri-environment schemes.

Future studies

Considerable scope exists for further research into farmer health and the financial status of farm households, some areas of which have already been mentioned above. On one level a repeat of the current study on a UK (or possibly European) scale could provide additional insights, providing certain issues were addressed. The Farm Business Survey (FBS) in England and Wales has historically used 'bolt-on' surveys to provide additional data about the financial aspects of specific farm enterprises. Conducting one targeted at farmer health could be a possibility, although this would represent a fairly radical departure from the usual nature and scope of bolt-on surveys. Since the FBS administrative centres would be paid an amount for each record collected, this has the potential to improve the response rate achieved. Lessons learned from the current study regarding questionnaire design (clarification/simplification of illness/service utilisation questions) and data collected (asking about off-farm income/transfer payment levels/amounts) could also be incorporated. There would also be the prospect of follow-up studies in subsequent years to provide longitudinal data.

However, while such an approach has the potential to generate a large dataset from farmers across the UK, the fundamental problem of how to reach the most depressed farmers remains unsolved. In fact, as mentioned in Chapter 2, this is the most challenging aspect of future research. Also, it may be difficult to persuade the Department for Environment, Food and Rural Affairs (DEFRA) who fund the FBS in England to provide additional finance for such research.

Given the difficulty of reaching the most ill/depressed farmers through typical scientific survey methods, it may be that alternative approaches need to be explored. One of these may be to use community mental health teams and build on the experience of previous outreach projects to farmers such as the Farmers' Health Project in Lancashire/Cumbria (see Burnett and Mort, 2001). Once again funding is likely to be a major problem.

The way forward in this area of research is, therefore, far from clear. Nevertheless, the findings presented in this thesis suggest that any future studies should endeavour to address the following:

    (i)   adopt a longitudinal design over, say, between five and ten years, to allow inter-temporal comparisons and to examine trends in farmer health and farm financial data;

(ii)   include a qualitative component which could provide insight into how farmers perceive their income;

(iii) include a GHQ-12 type instrument to measure the concept of "life not worth living";

(iv)   attempt to gather data on all sources of farm household income.

9.4   Conclusions

The sample of farmers and farmers' spouses from the main survey proved to be relatively healthy compared to the general population in terms of both physical and mental health. Primary and secondary health care service utilisation among the survey sample was lower than that for the general population, reflecting their relatively favourable health status.

There did not appear to be any relationship between farm financial status and the physical health status of farmers. The evidence regarding any relationship between farm financial status and farmer mental health was inconclusive. While the formal null hypotheses postulated in Chapter 7 could not be rejected, there were some interesting findings that merit further investigation. The combined findings of the main survey and the agricultural show surveys tend to confirm the findings of Thomas *et al.* (2003) who found that, while farmers had a lower prevalence of psychiatric morbidity than the general population, they were more likely to report that life was not worth living.

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Appendices

Appendix 1.0

Agricultural show survey questionnaire version 1 used in survey year 1 (2002), page 1 of 2.

Employment and Health Questionnaire

This survey is designed to gather information on employment and health. Please complete the details on this page by ticking the appropriate answer. This survey is in the strictest confidence.

1 Are you male or female? *Please tick one box.* ☐ Male ☐ Female

2 What is your age? *Please tick the appropriate box.*
☐ 16 - 24 ☐ 25 - 34 ☐ 35 - 44 ☐ 45 - 54 ☐ 55 - 64 ☐ 65+

3 At what age were you last in full-time education? ☐ Or tick box if currently in full-time education.

4 Please insert the first 5 letters / numbers of your home postcode. ☐☐☐☐☐ ■

5 Which of the following **best** describes the location of your home? *Please tick one box only.*
☐ Urban (city / town centre) ☐ Suburbs of town / city ☐ Village / hamlet ☐ Open countryside

6 Are you the spouse/partner of a farmer? *Please tick one box.* ☐ Yes ☐ No

6a Have you left agricultural employment in the past 2 years? ☐ Yes ☐ No
If **Yes**, Which of the following best describes your former role on the farm?
☐ Farm business owner / partner ☐ Farm worker ☐ Employed manager

7 Which of the following **best** describes your current employment situation? *Please tick one box only.*
☐ **a** Employee ☐ **b** Self-employed **with** employees ☐ **c** Self-employed **without** employees ☐ Seeking work
☐ Retired ☐ Looking after home/family ☐ Permanently sick/disabled ☐ Full-time education

| If you ticked **a, b** or **c** please answer questions 8 - 12 for your main job, otherwise please answer the questions overleaf. |

8 How many people work for your employer at the place where you work? If you are self-employed, please indicate how many people you employ.
☐ 1 - 9 ☐ 10 - 24 ☐ 25 - 499 ☐ 500 or more

9 What is the full title of your main job? _____

10 Describe what you do in your main job. _____

11 Do you supervise any other employees? ☐ Yes ☐ No

12 What is the business of your employer at the place where you work? If you are self-employed/freelance or have your own business, what is the nature of your business? _____

| If you currently work on a farm please answer questions A1 to A5 and then proceed to the questions overleaf, otherwise please proceed now to the questions overleaf. |

A1 How long have you worked in agriculture? ☐ years

A2 Which of the following do you have responsibility for? *Please tick all boxes that apply.*
☐ Day to day decisions about farming activities ☐ Financial decisions ☐ Major strategic decisions

A3 What is the total area of land that you farm? ☐ acres **Or** ☐ hectares

A4 What type of farm do you currently own, manager or work on? *Please tick one box only.*
☐ Mixed arable and livestock ☐ Mainly arable ☐ Mainly dairy ☐ Other
☐ Mixed livestock ☐ Mainly sheep ☐ Pigs and poultry

A5 Are you considering leaving agriculture in the near future? ☐ Yes ☐ No
If **Yes**, when do you anticipate leaving? ☐ In the next 6 months ☐ In the next year ☐ Beyond 1 year

PLEASE TURN OVER AND ANSWER THE QUESTIONS OVERLEAF

Appendix 1.1

Agricultural show survey questionnaire version 2 used in survey years 2 and 3 (2003 and 2004 respectively), page 1 of 2.

Employment and Health Questionnaire

This survey is designed to gather information on employment and health. Please complete the details on this page by ticking the appropriate answer. This survey is in the strictest confidence.

1 Are you male or female? *Please tick one box.* ☐ Male ☐ Female

2 What is your age? *Please tick the appropriate box.*
☐ 16 - 24 ☐ 25 - 34 ☐ 35 - 44 ☐ 45 - 54 ☐ 55 - 64 ☐ 65+

3 In which county is your home located? _____

4 Which of the following **best** describes the location of your home? *Please tick one box only.*
☐ Urban (city / town centre) ☐ Suburbs of town / city ☐ Village / hamlet ☐ Open countryside

5 Are you the spouse/partner of a farmer? *Please tick one box.* ☐ Yes ☐ No

6 Which of the following **best** describes your current employment situation? *Please tick one box only.*
☐ **a** Employee ☐ **b** Self-employed **with** employees ☐ **c** Self-employed **without** employees ☐ Seeking work
☐ **d** Retired ☐ Looking after home/family ☐ Permanently sick/disabled ☐ Full-time education

> If you ticked **a**, **b**, **c** or **d** please answer questions 8 - 12 for your main job, or your last job if retired. Otherwise please answer the questions overleaf.

7 How would you describe your main job? *Please tick one box.* ☐ Part-time ☐ Full-time

8 What is the full title of your main job? _____

9 Do you supervise any other employees? *Please tick one box.* ☐ Yes ☐ No

10 What is the business of your employer at the place where you work? If you are self-employed/freelance or have your own business, what is the nature of your business? _____

11 How many people work for your employer at the place where you work? If you are self-employed, please indicate how many people you employ.
☐ 1 - 9 ☐ 10 - 24 ☐ 25 - 499 ☐ 500 or more

12 Do you have another job in addition to the one above? *Please tick one box.* ☐ Yes ☐ No
If **Yes**, what is the full title of this job? _____

> If you currently work on a farm please answer questions **A1** to **A5** and then proceed to the questions overleaf, otherwise please proceed now to the questions overleaf.

A1 How long have you worked in agriculture? ☐ years

A2 What is the total area of land that you farm? ☐ acres **Or** ☐ hectares

A3 What type of farm do you currently own, manage or work on? *Please tick one box only.*
☐ Mixed arable and livestock ☐ Mainly arable ☐ Mainly dairy ☐ Poultry
☐ Mixed livestock ☐ Mainly sheep ☐ Mainly beef ☐ Pigs
☐ Other, please specify _____

A4 Which, if any, of the following agri-environment schemes have you joined? *Please tick all boxes that apply.*
☐ Tir Gofal ☐ Tir Cymen ☐ ESA ☐ Other – Please specify: _____

A5 Are you considering leaving agriculture in the near future? ☐ Yes ☐ No
If **Yes**, when do you anticipate leaving? ☐ In the next 6 months ☐ In the next year ☐ Beyond 1 year

PLEASE TURN OVER AND ANSWER THE QUESTIONS OVERLEAF

Appendix 1.2

The twelve itemed version of the General Health Questionnaire; page 2 of 2 of the agricultural show survey questionnaire, for all 3 survey years (2002 to 2004).

The General Health Questionnaire

Please read this carefully

We should like to know if you have had any medical complaints and how your health has been in general, *over the last few weeks*. Please answer ALL the questions simply by underlining the answer which you think most nearly applies to you. Remember that we want to know about present and recent complaints, not those that you had in the past.

It is important that you try to answer ALL the questions.

HAVE YOU RECENTLY:

1 - **been able to concentrate on whatever you're doing?**	Better than usual Same as usual Less than usual Much less than usual	
2 - **lost much sleep over worry?**	Not at all No more than usual Rather more than usual Much more than usual	
3 - **felt that you are playing a useful part in things?**	More so than usual Same as usual Less useful than usual Much less useful	
4 - **felt capable of making decisions about things?**	More so than usual Same as usual Less so than usual Much less capable	
5 - **felt constantly under strain?**	Not at all No more than usual Rather more than usual Much more than usual	
6 - **felt you couldn't overcome your difficulties?**	Not at all No more than usual Rather more than usual Much more than usual	
7 - **been able to enjoy your normal day-to-day activities?**	More so than usual Same as usual Less so than usual Much less than usual	
8 - **been able to face up to your problems?**	More so than usual Same as usual Less able than usual Much less able	
9 - **been feeling unhappy and depressed?**	Not at all No more than usual Rather more than usual Much more than usual	
10 - **been losing confidence in yourself?**	Not at all No more than usual Rather more than usual Much more than usual	
11 - **been thinking of yourself as a worthless person?**	Not at all No more than usual Rather more than usual Much more than usual	
12 - **been feeling reasonably happy, all things considered?**	More so than usual About same as usual Less so than usual Much less than usual	

Thank you for your time. Your help is very much appreciated.

Boxes below for office use only

Thermometer sheet completed? [Yes] [No] Interviewer initials [ ] Sequential No. [ ][ ]

For further details regarding this research please contact: Barry Hounsome, Tel: (01248) 382470, E-mail: b.hounsome@bangor.ac.uk

GHQ [ ] Likert [ ] CGHQ [ ]

Appendix 1.3

Supplementary stress survey sheet used in the agricultural show survey in year 2 (2003), page 1 of 2.

For office use:

Interviewer initials [ ]   Sequential number (from main questionnaire) [ ][ ][ ]

<u>Stress Questionnaire</u>

Below is a list of issues, which may be of concern to you. Please mark them according to the level of stress each causes using the rating scale below:

1 – no stress   **2** – mild stress   **3** – moderate stress   **4** – severe stress   **5** – extreme stress

Making major purchases for the business	[1]	[2]	[3]	[4]	[5]
Filling in government forms	[1]	[2]	[3]	[4]	[5]
Not seeing enough people from day to day	[1]	[2]	[3]	[4]	[5]
Equipment breakdown at busy times	[1]	[2]	[3]	[4]	[5]
Worried about overseas competition	[1]	[2]	[3]	[4]	[5]
Too much to do and too little time to do it	[1]	[2]	[3]	[4]	[5]
Adjusting to new government regulations and policies	[1]	[2]	[3]	[4]	[5]
Long hours of work	[1]	[2]	[3]	[4]	[5]
Not enough ready cash	[1]	[2]	[3]	[4]	[5]
Risk of work related injury	[1]	[2]	[3]	[4]	[5]
Not being free to make my own decisions at work	[1]	[2]	[3]	[4]	[5]
Personal illness during busy times	[1]	[2]	[3]	[4]	[5]
Feeling isolated at work	[1]	[2]	[3]	[4]	[5]
Uncertainty about weather conditions	[1]	[2]	[3]	[4]	[5]
Worrying about market conditions	[1]	[2]	[3]	[4]	[5]
Worrying about keeping business in the family	[1]	[2]	[3]	[4]	[5]
Use of hazardous materials at work	[1]	[2]	[3]	[4]	[5]
Problems of balancing work and family duties	[1]	[2]	[3]	[4]	[5]
Keeping up with new technology and procedures	[1]	[2]	[3]	[4]	[5]
Deciding when to sell produce/goods	[1]	[2]	[3]	[4]	[5]
Complying with environmental regulations	[1]	[2]	[3]	[4]	[5]
Lack of close neighbours	[1]	[2]	[3]	[4]	[5]
Worrying about continued viability of business	[1]	[2]	[3]	[4]	[5]
Taking few holidays away from the business	[1]	[2]	[3]	[4]	[5]

PLEASE TURN OVER AND ANSWER THE QUESTIONS OVERLEAF

Derived from McGregor et al., 1995 and Boulanger et al., 1999a.

Supplementary stress survey sheet used in the agricultural show survey in year 2 (2003), page 2 of 2.

1 – no stress   2 – mild stress   3 – moderate stress   4 – severe stress   5 – extreme stress

Financing my retirement	1	2	3	4	5
Having to travel long distances for services, shopping and health care	1	2	3	4	5
Changes in European policy	1	2	3	4	5
Unplanned interruptions	1	2	3	4	5
Having no help with the business	1	2	3	4	5
Worrying about owing money	1	2	3	4	5
Worrying about the public image of my industry	1	2	3	4	5
Significant production loss due to disease/pests/weeds	1	2	3	4	5

Do you have any comments that you wish to make concerning your business/work and the its effect on your health?

Thank you for taking the time to complete this questionnaire. Your help is very much appreciated.

Derived from McGregor et al., 1995 and Boulanger et al., 1999a.

Appendix 2.0

Main survey questionnaire (page 1 of 12).

Canolfan Economeg Iechyd

Project Iechyd Teuluoedd Fferm

Farm Family Health Project

BANGOR
UNIVERSITY OF WALES

The Farm Family Health Project is a study looking at the health of farming families in Wales, their contact with health services and their views as to how they may be improved. As part of this project a survey of farmers and their spouses/partners is being conducted during 2002 with the assistance of the Farm Business Survey in Wales. Your assistance with this research, which has the full backing of the Farmers' Union of Wales and the National Farmers Union Cymru, would be very much appreciated. We would be grateful if you could complete this questionnaire and return it to the University of Wales, Bangor in the postage paid envelope provided (no stamp required). Alternatively, please use the postage paid address below (no stamp required):

Barry Hounsome,
School of Agricultural & Forest Sciences,
University of Wales, Bangor,
BG 35 FREEPOST,
Deiniol Road,
BANGOR, LL57 1BR.

The information that you supply through this questionnaire will be treated as **strictly confidential** and will only be available to the research team at Bangor in a form that safeguards your anonymity.

Your Farm Number, below, has been entered to allow comparisons between groups of similar farms to be made. No individual farm details will be published in any form. In addition, your Investigational Officer from the Farm Business Survey will not have access to your completed questionnaire. Similarly, the research team at the University of Wales in Bangor will be unable to identify you or your farm from this number. Please note that completed questionnaires cannot be included in the survey without the Farm Number.

Farm Number: ☐☐☐☐☐

SECTION A - Health Service Usage

This section asks you about your contact with health services over the past 12 months.

A1. When did you last talk to your family doctor (GP) about your own health?
Please tick one box.

☐ In the past 3 months — **Please go to QUESTION A2**
☐ In the past 3-12 months — **Please go to QUESTION A2**
☐ Over 12 months ago or never — **Please go to QUESTION A5**
☐ Not registered with a doctor — **Please go to QUESTION A6**

A2. Which of the following best describes the circumstances in which you spoke to him/her?
Please tick one box.

☐ On the telephone ☐ At the doctor's surgery ☐ During a home visit by the doctor
☐ Other, please specify: _____

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Main survey questionnaire (page 2 of 12).

A3. Please could you specify the main reason (ailment, condition, etc) for speaking to them?

Reason: _____

A4. How many times have you talked to your family doctor (GP) about your own health in the past 12 months? `[     ]` times

A5. How many miles by road is your doctor's surgery from your home? `[     ]` miles

A6. When did you last talk to a medical practitioner <u>other than</u> your family doctor about your health (e.g. nurse, physiotherapist, etc, but <u>excluding</u> your dentist). *Please tick one box.*

`[  ]` In the past 3 months	**Please go to QUESTION A7**
`[  ]` In the past 3-12 months	**Please go to QUESTION A7**
`[  ]` Over 12 months ago or never	**Please go to QUESTION A11**

A7. Which medical practitioner did you talk to on this occasion about your own health? *Please tick one box.*

`[  ]` Nurse	`[  ]` Counsellor
`[  ]` Health Visitor	`[  ]` Community Psychiatric Nurse (CPN)
`[  ]` Physiotherapist	`[  ]` Other, please specify: _____

A8. Which of the following best describes the circumstances of this contact? *Please tick one box.*

`[  ]` On the telephone	`[  ]` At the doctor's surgery	`[  ]` During a home visit
`[  ]` Other, please specify: _____		

A9. Please could you specify the main reason (ailment, condition, etc) for this contact?

Reason: _____

A10. How many times have you talked to a medical practitioner, other than your family doctor (GP) about your own health in the past 12 months? `[     ]` times

A11. When did you last go to hospital as an out-patient (include having an operation or treatment, then going home the same day)? *Please tick one box.*

`[  ]` In the past 3 months	**Please go to QUESTION A12**
`[  ]` In the past 3-12 months	**Please go to QUESTION A12**
`[  ]` Over 12 months ago or never	**Please go to QUESTION A13**

A12. On how many occasions have you been to hospital as an out-patient in the last 12 months? `[     ]` times

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Main survey questionnaire (page 3 of 12).

A13. Are you currently on an NHS waiting list for a hospital out-patient appointment (consultation, etc)?
*Please tick **one** box.*

Yes ☐   No ☐

If **Yes**, how long have you been waiting for this appointment? ☐ years ☐ months

Please give the reason (condition/ailment) for this appointment? _____

A14. When did you last go to a Casualty Department (or Accident and Emergency Unit) to be treated?
*Please tick **one** box.*

☐ In the past 3 months   **Please go to QUESTION A15**
☐ In the past 3-12 months   **Please go to QUESTION A15**
☐ Over 12 months ago or never   **Please go to QUESTION A16**

A15. How many times have you been treated at a Casualty Department (or Accident and Emergency Unit) in the past 12 months? ☐ times

A16. How many miles by road is your nearest Accident and Emergency Hospital from your home? ☐ miles

A17. When did you last stay in hospital as an in-patient (that is staying overnight or longer)?
*Please tick **one** box.*

☐ In the past 3 months   **Please go to QUESTION A18**
☐ In the past 3-12 months   **Please go to QUESTION A18**
☐ Over 12 months ago or never   **Please go to QUESTION A19**

A18. On how many occasions have you stayed in hospital as an in-patient in the last 12 months? ☐ times

A19. Are you currently on an NHS waiting list for treatment (operation, etc) that will require a stay in hospital?
*Please tick **one** box.*

Yes ☐   No ☐

If **Yes**, how long have you been waiting for this treatment? ☐ years ☐ months

What treatment are you waiting for? _____

A20. Have you heard of NHS Direct? *Please tick **one** box.*   Yes ☐   No ☐

If **Yes**, have you ever used it?   Yes ☐   No ☐

If **Yes**, what ailment/condition did you seek advice about? _____

A21. Have you ever sought any medical advice or medical information using the internet? *Please tick **one** box.*

Yes ☐   No ☐

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Main survey questionnaire (page 4 of 12).

A22. How important do you feel that the following factors are to you when considering whether to seek medical advice or treatment? *Please circle the appropriate number in* **each** *line.*

	Unimportant Factor	Slightly Important Factor	Moderately Important Factor	Very Important Factor
Opening hours of your GP's surgery	0	1	2	3
Having to make an appointment to see a doctor	0	1	2	3
Distance to your GP's surgery	0	1	2	3
Availability of public transport	0	1	2	3
The time of year	0	1	2	3
Embarrassment about friends/neighbours knowing that you are ill	0	1	2	3
Your workload	0	1	2	3
Believing that the doctor will not be able to help you	0	1	2	3
Believing that the doctor is too busy to see you	0	1	2	3

A23. Please indicate to what extent the following improvements to health care service provision would be of benefit to you? *Please circle the appropriate number in* **each** *line.*

	No Benefit	Slightly Beneficial	Moderately Beneficial	Very Beneficial
Longer GP surgery opening hours	0	1	2	3
Greater confidentiality	0	1	2	3
No need to make an appointment	0	1	2	3
GP home visits more readily available	0	1	2	3
Availability of mobile health services (such as mobile clinics visiting farmers' markets)	0	1	2	3
Improved public transport	0	1	2	3
Wider range of services available at your GP's surgery	0	1	2	3
Improved availability of medical information by telephone	0	1	2	3
Improved availability of medical information through the internet	0	1	2	3

A24. Do you have any comment, views or opinions concerning health care provision in your area that you would like to express? *Please use the space below.*

_____

_____

_____

_____

_____

_____

_____

_____

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Main survey questionnaire (page 5 of 12).

SECTION B - Illnesses

These questions are about any illnesses or disabilities you may have. Please include only illnesses or disabilities that <u>a doctor has treated you for</u>.

B1. Have you ever been treated for any of these HEART DISEASES?
      Please tick all boxes that apply.

      Yes ☐ Angina
          ☐ Heart attack (or coronary)
          ☐ Heart failure
          ☐ High blood pressure (or hypertension)
          ☐ Another heart disease
      No ☐ Have not had any heart diseases

B2. Have you ever been treated for CANCER?
      Please tick all boxes that apply.

      Yes ☐ Lung cancer
          ☐ Breast cancer
          ☐ Bowel cancer
          ☐ Skin cancer
          ☐ Another kind of cancer
      No ☐ Have not had cancer

B3. Do you have any of these CHEST troubles or BREATHING difficulties now?
      Please tick all boxes that apply.

      Yes ☐ Asthma
          ☐ Cystic fibrosis
          ☐ Emphysema
          ☐ Pleurisy
          ☐ Tuberculosis (TB)
          ☐ Spells of bronchitis over 3 years
          ☐ Another chest or breathing problem
      No ☐ Do not have any chest or breathing problems

B4. Do you have any MENTAL or NERVOUS ILLNESS now that you have had for 3 months or more?
      Please tick all boxes that apply.

      Yes ☐ Depression
          ☐ Anxiety
          ☐ Alzheimer's disease
          ☐ Schizophrenia
          ☐ Another mental or nervous disorder
      No ☐ Do not have any mental or nervous illness now that I have had for 3 months or more

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Main survey questionnaire (page 6 of 12).

B5. Do you have any of these conditions now?
*Please tick **all** boxes that apply.*

Yes ☐ Arthritis
☐ Back pain
☐ Epilepsy or fits
☐ Stroke
☐ Parkinson's disease
☐ Pressure sores or bed sores
☐ Varicose veins
No ☐ Do not have any of these conditions

B6. Do you have DIABETES?
*Please tick **all** boxes that apply.*

Yes ☐ And it is treated by injection
☐ And it is treated by tablets
☐ And it is treated by diet only
No ☐ Do not have diabetes

B7. Have you had any accident, injury, or poisoning, needing hospital treatment or a visit to Casualty in the past 3 months? If you have had more than one injury, please think of the most recent one.
*Please tick **one** box.*

The injury was a:
Yes ☐ Break or fracture
☐ Poisoning
☐ Head injury
☐ Cut or puncture
☐ Burn
☐ Another kind of injury
No ☐ Have not had any of the above injuries or accidents in the past three months

If **Yes**, where did the accident, injury or poisoning take place?
*Please tick **one** box.*

☐ In the home
☐ In traffic
☐ On the farm
☐ Somewhere else

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B8. Have you had any accident, injury, or poisoning, in the past 3 months for which you <u>did not</u> need hospital treatment or a visit to Casualty? If you have had more than one injury, please think of the most recent one. *Please tick* **one** *box.*

The injury was a:

Yes ☐ Break or fracture
☐ Poisoning
☐ Head injury
☐ Cut or puncture
☐ Burn
☐ Another kind of injury
No ☐ Have not had any of the above injuries or accidents in the past three months

If **Yes**, where did the accident, injury or poisoning take place?
Please tick **one** *box.*

☐ In the home
☐ In traffic
☐ On the farm
☐ Somewhere else

Section C - Your Own Health

Questions C1 to C11 are from SF-36® Health Survey © 1988, 2002 by Medical Outcomes Trust and QualityMetric Incorporated. All rights reserved. SF-36® is a registered trademark of Medical Outcomes Trust.

This section asks for your views about your health, how you feel, and how well you are able to do your usual activities.

If you are unsure about how to answer a question, please give the best answer you can. You need not spend too much time answering each question in this section, as your first answer is likely to be your best.

C1. In general, would you say your health is: *Please circle* **one** *number.*

Excellent	Very good	Good	Fair	Poor
1	2	3	4	5

C2. <u>Compared to one year ago</u>, how would you rate your health in general <u>now</u>? *Please circle* **one** *number.*

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse Now than one year ago
1	2	3	4	5

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Main survey questionnaire (page 8 of 12).

C3. The following items are about activities you might do during a typical day. <u>Does your health now limit</u> you in these activities? If so, how much? *Please circle* **one** *number on* **each** *line.*

ACTIVITIES	Yes, Limited A Lot	Yes, Limited A Little	No, Not Limited At All
a. **Vigorous activities**, such as running, lifting heavy objects, participating in strenuous sports	1	2	3
b. **Moderate activities**, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	1	2	3
c. Lifting or carrying a bag of shopping	1	2	3
d. Climbing **several** flights of stairs	1	2	3
e. Climbing **one** flight of stairs	1	2	3
f. Bending, kneeling, or stooping	1	2	3
g. Walking **more than a mile**	1	2	3
h. Walking **half a mile**	1	2	3
i. Walking **one hundred yards**	1	2	3
j. Bathing or dressing yourself	1	2	3

C4. During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of your physical health</u>? *Please circle* **one** *number on* **each** *line.*

	Yes	No
a. Cut down on the **amount of time** you spent on work or other activities	1	2
b. **Accomplished less** than you would like	1	2
c. Were limited in the **kind** of work or other activities	1	2
d. Had **difficulty** performing the work or other activities (for example, it took extra effort)	1	2

C5. During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of any emotional problems</u> (such as feeling depressed or anxious)? *Please circle* **one** *number on* **each** *line.*

	Yes	No
a. Cut down on the **amount of time** you spent on work or other activities	1	2
b. **Accomplished less** than you would like	1	2
c. Didn't do work or other activities as **carefully** as usual	1	2

C6. During the <u>past 4 weeks</u>, to what <u>extent</u> has your <u>physical health or emotional problems</u> interfered with your

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Main survey questionnaire (page 9 of 12).

C6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups? *Please circle* **one** *number.*

Not at all	Slightly	Moderately	Quite a bit	Extremely
1	2	3	4	5

C7. How much bodily pain have you had during the past 4 weeks?
Please circle **one** *number.*

None	Very Mild	Mild	Moderate	Severe	Very Severe
1	2	3	4	5	6

C8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)? *Please circle* **one** *number.*

Not at all	Slightly	Moderately	Quite a bit	Extremely
1	2	3	4	5

C9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the of the time during the past 4 weeks...
Please circle **one** *number on* **each** *line.*

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
a. Did you feel full of life?	1	2	3	4	5	6
b. Have you been a very nervous person?	1	2	3	4	5	6
c. Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
d. Have you felt calm and peaceful?	1	2	3	4	5	6
e. Did you have a lot of energy?	1	2	3	4	5	6
f. Have you felt downhearted and low?	1	2	3	4	5	6
g. Did you feel worn out?	1	2	3	4	5	6
h. Have you been a happy person?	1	2	3	4	5	6
i. Did you feel tired?	1	2	3	4	5	6

C10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends or relatives)? *Please circle* **one** *number.*

All of the time	Most of the time	Some of the time	A little of the time	None of the time
1	2	3	4	5

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C11. How TRUE or FALSE is <u>each</u> of the following statements for you?
Please circle **one** *number on* **each** *line.*

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
a. I seem to get ill a little easier than other people	1	2	3	4	5
b. I am as healthy as anybody I know	1	2	3	4	5
c. I expect my health to get worse	1	2	3	4	5
d. My health is excellent	1	2	3	4	5

C12. Which one of these best describes you?
Please tick **one** *box only.*

☐ I smoke daily
☐ I smoke occasionally but not every day
☐ I used to smoke daily but do not smoke at all now
☐ I used to smoke occasionally but do not smoke at all now
☐ I have never smoked

PLEASE USE THE FOLLOWING TABLE TO ANSWER **QUESTION C13**

1 pint of beer, lager, cider =	½ pint beer, lager, cider =	1 glass wine, sherry, vermouth =	Single spirit measure (whisky, gin, vodka, etc.) =	Double spirit measure =
2 units	1 unit	1 unit	1 unit	2 units

C13. In a typical seven day week, how many units of alcohol would you drink (including weekends)?
Please tick **one** *box for a whole week.*

☐ None
☐ 1 – 7 units
☐ 8 – 14 units
☐ 15 – 21 units
☐ 22 – 35 units
☐ 36 – 50 units
☐ 51 units or more

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Main survey questionnaire (page 11 of 12).

Valuing your own health today

C14. Please indicate on this scale how good or bad your own health is today.

- The best health state you can imagine is marked 100 and the worst health state you can imagine is marked 0.

- Please draw a line from the box below to the point on the scale that indicates how good or bad your health state is today.

┌──────────┐
│ **Your own** │
│ **health** │
│ **state** │
│ **today** │
└──────────┘

Best imaginable health state

1 0 0

9. 0

8. 0

7. 0

6. 0

5. 0

4. 0

3. 0

2. 0

1. 0

0

Worst imaginable health state

Source: EuroQol, 2005.

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Main survey questionnaire (page 12 of 12).

Section D - About Yourself

This section seeks some general background information about you and your home situation

D1. Are you male or female. *Please tick one box.*　　　　Male ☐　　Female ☐

D2. What is your age? *Please enter the number of years.* ☐

D3. Please indicate your marital status. *Please tick one box.*

Single ☐	Separated ☐
Married ☐	Divorced ☐
Co-habiting ☐	Widowed ☐

D4. Which of the following descriptions best describes your situation? *Please tick one box only.*

I spend all of my time on the farm. ☐
I spend most of my time on the farm and also have an off-farm job. ☐
I split my time equally between the farm and an off-farm job. ☐
I look after the household and have an off-farm job. ☐
I look after the household and help occasionally on the farm. ☐

D5. Please indicate the number of children (under 16 years old) that live at this address for each age category. *Please enter the appropriate number in each box.*

Under 1 year old ☐
Over 1 year old but pre-schooling ☐
At nursery-school/primary ☐
At secondary school ☐

If **female**, are you pregnant at the moment? *Please tick one box.*　Yes ☐　　No ☐

D6. Which of the following insurance cover (if any) do you have?
Please tick all boxes that apply.

☐ Life assurance　　☐ Personal accident insurance　　☐ Private health insurance

Please enter the date that you completed this questionnaire: [Day | Month]

Thank you for taking the time to complete this questionnaire. Your help is very much appreciated.

Please return the completed questionnaire to the University of Wales, Bangor in the postage paid envelope provided (no stamp required).

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Appendix 2.1

The letter to farmers and their spouses/partners that accompanied the main survey questionnaire.

Project Iechyd Teuluoedd Fferm

Farm Family Health Project

Dear Sir / Madam,

We are writing to ask you for your assistance with the *Farm Family Health Project* currently being run by the University of Wales, Bangor. The project seeks to relate issues regarding the health of farming families in Wales to the adverse economic conditions experienced by the agricultural sector in recent years. As part of this project a survey of farmers and their spouses/partners is being conducted during 2002 with the assistance of the Farm Business Survey in Wales. The survey has the full support of the National Farmers Union Cymru and the Farmers' Union of Wales.

At the present time there is very little reliable information available concerning the health of farmers in Wales. We therefore anticipate that this survey will help to address a number of important issues concerning the health of farmers and their spouses/partners in Wales. For example, it would allow:

- reliable information concerning the health of farmers and their spouses/partners to be available to assist with decision making about the distribution of health services between urban and rural areas of Wales;

- the effect of falling farm incomes, compounded by Foot and Mouth Disease in 2001, on farmers' health to be assessed;

- patterns of health service usage among farmers and their spouses to be ascertained and the potential barriers to health service usage identified;

- comparisons with other occupational groups;

- inequalities with respect to health services to be examined.

Your Farm Business Survey Investigational Officer has kindly agreed to deliver this survey pack to you on our behalf in order to preserve anonymity and confidentiality. In addition to this letter, the pack comprises of two questionnaires (one for yourself and one for your spouse/partner) along with two postage paid envelopes for the return of the completed questionnaires to the University of Wales, Bangor.

All information supplied by you in the questionnaires will be treated in the **strictest confidence**. Your Investigational Officer from the Farm Business Survey will not have any access to your completed questionnaire. Similarly, the research team at Bangor will be unable to identify you or your farm from the information supplied.

While we appreciate that many demands are placed on the time of you and your family, we would very much appreciate your assistance with this research. The questionnaires have been designed for ease of completion with most answers requiring only a tick in a box or the circling of a number. We estimate that the questionnaire will take approximately twenty minutes to complete. Should you require any assistance or clarification, please do not hesitate to contact Barry Hounsome on (01248) 382470 (direct line) in office hours.

Yours faithfully,

Dr Rhiannon Tudor Edwards.   Barry Hounsome.
Senior Research Fellow.   Research Fellow.

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Appendix 2.2

The project briefing sheet supplied to Investigational Officers of the Farm Business Survey in Wales.

For IO Use Only – Not for circulation

Farm Family Health Project

IO Information Sheet

Who is conducting the study?

Two research groups from the University of Wales, Bangor are involved - The Centre for the Economics of Health with support from the School of Agricultural and Forest Sciences.

What are the objectives of the study/survey?

To investigate the health of farmers and their spouses/partners against the background of a substantial and sustained decline in agricultural prices and farm incomes in recent years together with the additional strain caused by Foot and Mouth in 2001. The survey will allow:

- Reliable information to be available to assist with decision making about the distribution of health service provision between urban and rural areas of Wales. At present in Wales the Assembly's commitment to tackle inequalities in health is focussed on redirecting NHS resources towards areas of industrial decline such as the South Wales Valleys. This inevitably will be at the expense of North and Mid Wales which are largely rural.

- Reliable information to be available to decision makers seeking to organise health services to meet the needs of farming families.

- The effect of falling farm incomes, compounded by Foot and Mouth Disease in 2001, on farmers' health to be assessed.

- Patterns of health service usage among farmers and their spouses to be ascertained and the potential barriers to health service usage identified.

- Comparisons with other occupational groups.

- Socio-economic inequalities with respect to health service provision to be examined.

Why look at farmers' health?

Very little information is available about the health of farming families in Wales. Farming families help maintain the rural communities and act as custodians of the countryside.

What is involved in taking part in the study?

Completion of a simple questionnaire which should take approximately twenty minutes. Postage paid envelopes are provided for the return of the questionnaire.

What about confidentiality?

All information supplied will be treated in the strictest confidence. The completed questionnaires will only be seen by the research team at Bangor and they will be unable to identify individuals or farms from the information supplied.

Have the farming unions endorsed the study?

Both the Farmers' Union of Wales and the National Farmers Union Cymru have pledged their full support. MIND and CWYSI have also welcomed the study.

Appendix 2.3

The letter of support from the Farmers' Union of Wales, a copy of which was supplied to Investigational Officers of the Farm Business Survey in Wales.

UNDEB AMAETHWYR CYMRU
FARMERS' UNION OF WALES
P R I F   S W Y D D F A   •   H E A D   O F F I C E

Llys Amaeth, Plas Gogerddan, Aberystwyth, Ceredigion, SY23 3BT.
Ffôn/Tel: (01970) 820820   Ffacs/Fax: (01970) 820821

E-bost/E-mail: headoff@fuw.btinternet.com
Rhyngrwyd/Internet: http://www.fuw.org.uk

Ein Cyf/Our ref: ATJ/EMS/V/33
Dyddiad/Date: 9 January 2002

Eich Cyf/Your ref:

Mr Barry Hounsome
Principal Researcher
Institute of Medical & Social Care Research
University of Wales
Wheldon Building
BANGOR
Gwynedd
LL57 2UW

Dear Mr Hounsome

FARM FAMILY HEALTH PROJECT

May I firstly thank you for taking the time to contact the Farmers' Union of Wales.

I write on behalf of Mr Arwyn Owen, Director of Policy, to inform you of the Farmers' Union of Wales' wish to pledge it's support for the Farm Family Health Project. The Union would be pleased to assist in any way and the information has already been passed on to the PR department.

Yours sincerely

ANN THOMAS-JONES (Miss)
Assistant Commodities Officer

Appendix 2.4

The letter of support from the National Farmers' Union Wales, a copy of which was supplied to Investigational Officers of the Farm Business Survey in Wales.
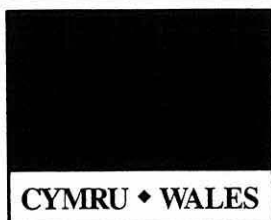
CYMRU ◆ WALES

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24 Tawe Business Village, Phoenix Way,
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Mr Barry Hounsome	Ein cyf/Our ref:	JMT/BMM
Centre for Health Economics	Eich cyf/Your ref:	
Institute of Medical and Social Care		
Weldon Building	E-mail:	malcolm.thomas@nfu.org.uk
University of Wales		
BANGOR LL57 2UW	Dyddiad/Date:	02 January 2002

Dear Barry

Thank you for your letter of 18th December regarding the Farm Family Health Project. I am more than happy to recommend our members participate in your survey and feel free to use this letter in any way which you feel may be useful. I will also include a short note on the project in our publication Farming Wales.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

J MALCOLM THOMAS
DIRECTOR
NFU CYMRU ◆ WALES